A Record of Solid Accomplishment

THE FIFTH of AVIATION'S annual statistical reviews launches forth upon a sea of troubles. The Army is flying the mail, gallantly doing its best with a problem of appalling complexity. The airlines have lost two-thirds of their revenue during the past week, and have no way of knowing when, or whether, they will get it back. The present indication is that unless something happens very soon the amount of passenger service provided will have been reduced about a third by the time this issue of AVIATION actually reaches the reader. The committee of inquiry, having rectified the domestic air mail situation, is understood to be preparing to move on to see what can be done about the foreign mail service.

In the meantime the great powers of the world are busily modernizing and expanding their air forces, and we are moving along in that direction ourselves. In particular, the Navy is at last securing an authorization to increase the total number of naval airplanes to provide equipment for the ships that have been added to the fleet since the last authorization was framed, so emancipating the Ranger from her threatened unseemly rôle of being an airplane carrier without airplanes. The Army's program is less definite, but certainly an enlargement of some kind is in the making.

How rapidly it will be made remains to be seen. With two committees and a grand jury investigating procurement, with all placing of contracts held up, and with a welter of schemes of profit limitation, and construction in government plants, and varied amendments to the basic procurement law and to procurement tactics, and wild denunciations by professional denouncers all competing with each other for attention, the immediate prospect is for more excitement than progress. Struggling to bring the kaleidoscopic scene into focus, one is moved to comment satirically upon the optimism with which the editor of AVIATION only two months ago undertook to prepare his annual prophecy for the aeronautical developments of the year. Just at present one could assemble enough seventh sons of seventh sons to make a complete football team, and the whole outfit wouldn't be able to figure out what was likely to happen next Thursday, to say nothing of six weeks hence.

But no one can work intensively for a month upon the record of what has happened in American aviation over the past two or three years without feeling at least a little optimism. At least up to within the last six weeks, aviation had come through the depression without the loss of any essential ground. Aircraft and air travel were gaining in public confidence and appreciation, and public patronage of their services was gradually increasing. Technical progress has been constant, and at times, particularly during the last eighteen months, it has been spectacular. The number of pilots who keep their licenses active and the number of privately-owned planes have come surprisingly close to holding their own through a period of unparalleled general disillusionment and hardship. The value of aircraft in military affairs is being acclaimed with unprecedented enthusiasm, even in quarters heretofore among the most skeptical. Whatever else happens from now on, it is inevitable that there is to be a great and growing need for air transport and for military aviation, and also a substantial demand for private flying.

Nothing can destroy the bright record of the past, enshrined here in 20 pages of pictures and charts and tables. They tell the history and give the present status of one of the greatest and most courageous and most romantic episodes in the whole long tale of engineering science and of industry. We know that our regular readers, who are already acquainted with so much of the story, will re-study it carefully and with a mounting pride. We sincerely and confidently commend it to the attention and the careful consideration of the people outside the ranks of aeronautics into whose hands it may come, and most especially of all to those who are charged with the responsibility for determining the policies of the government.

This is the first occasion on which we have ever printed anything but statistical and pictorial material, and its discussion and interpretation, in the main feature section of a Record of Progress issue. No rule is too good to be broken with sufficiently good occasion, however, and this issue goes to press at a moment of fearful emergency for American aeronautics. It would be absurd for it to appear without direct mention of the emergency and its possible consequences. Hence we insert, before turning to the statistical section which is our main concern in March each year, a review of the subject which is for the moment uppermost in the mind of every person connected with American aviation,—the air mail contracts and their probable future destinies.

AIR MAIL—
The Record in the Case

THE COMPOSITION of this story is undertaken almost at the very moment when the first Army airplane is taking off with the first load of mail. About the most dramatic week in the history of aviation has attained its climax.

One's first impulse when the news of the cancellation came through on the evening of Feb. 9 was to give way to impotent despair at a situation that seemed so destructive and so incomprehensible. For a good four days the aeronautical world spent its time in trying to fit the evidence together in some coherent fashion and to get some idea of what it all meant. It seemed inconceivable then, and it seems inconceivable still, that anyone really intended that the existing air transport system should be leveled to the ground and rebuilt by a painstaking reassembly of its various elements into wholly new patterns.

Rational comment is badly needed. This is no time for emotion. The American people have so far had only a fragmentary presentation of the case. It ought to be laid before them in full, and it ought to be laid before them in terms of definite evidence. In discussing the cancellation and its consequences, we must stick as closely as possible to the record of actual fact and to the provable lessons of experience at home and abroad.

We shall try to do just that, but before taking up the charges that have been made against the American air mail lines and attempting to examine and to interpret them, there are a couple of things that must be said in more general terms. The first is that we explicitly and without qualification dissociate ourselves from any criticism of the Administration's motives. We are absolutely certain that the President intends that America shall have a first-class air transport system, and that he will take any action that he considers necessary to that end. We do feel that the action so far taken has been very unhappy and that there has as yet been no showing of any necessity for sudden general cancellation while the investigation was still going on, but we take for granted the essential soundness of the President's ultimate aims. We are only anxious that the progress towards those aims should be a sure one, with a minimum of injustice and waste and with full advantage taken of the record of past experience to guard against costly and time-consuming missteps along the way.

The second point on which we wish to make ourselves clear is that we have not the slightest sympathy with or tolerance for individual wrong-doing. Wherever criminal practices have existed, they should be dealt with severely. We have not the slightest desire in the world to protect any guilty party, if a guilty party can be found. We do wish to protect the innocent.

It seems to us, to put it very mildly and conservatively, that the American public has been getting an extraordinarily one-sided view of air transport during these past few weeks. Even the people who are in the business have very commonly received the same distorted impressions, for naturally the daily press is concerned mainly with the sensational aspects of an investigation and very little or not at all with the tremendous amount of technical detail that necessarily underlies it. Probably not 2 per cent of the readers of AVIATION, and certainly not one-hundredth of one per cent of the interested general public, have had the opportunity of reading even a major part of the specific record of fact relating to the air mail contracts and their administration, and of working out for themselves all of the figures of mileage flown and extensions granted and compensation paid under various contracts and the like that are pertinent to the Administration's action and to its probable consequences.

CONFERENCES FOR ALL

The full explanation of the cancellation of the contracts is still very far from clear, but some things have become apparent. It has become apparent, for example, that the meetings of air transport operators in the spring of 1930 are now considered as having been collusive and conspiratorial, nothwithstanding the fact that their existence and purpose was more or less fully described in the daily press and much more fully described in the pages of AVIATION at the time. It is worth recalling after a lapse of four years that this magazine made repeated report of just what was being done to build up an effective national air transport system and to maintain competitive lines so far as possible. It is worth recalling that not by any means all of the groups represented at the Postmaster General's conference were air mail contractors, either then or thereafter, and that on the other hand well over 90 per cent of all the transport mileage then being down was fully represented at the conference, with no operator of any importance missing.

It has not been sufficiently recognized that a major part of the essential structure of the air mail system had already been laid down prior to the 1930 conference and has been unchanged since that date. Substantially 60 per cent of the total domestic air mail operations at the end of 1933 were being carried on routes that existed at the time of the post office conferences of 1930 and that were still, at the end of 1933, in the hands of the original contractors or their direct successors by purchase. To have transferred or (as was the case with most of the routes concerned) to have newly created only 40 per cent of the total of air mail operations within the course of three and a half years seems by no means remarkable or excessive in a field so new, and one that has been developing and expanding so rapidly, as has been the case with air transport.

There has been too little attention paid also to the fact that Congress very wisely decided in 1928, even before the beginning of Mr. Brown's term in the Post Office, to get away from the periodic reopening of air mail contracts and their re-award by competitive bidding. It was recognized that to build up and maintain a proper organization some assurance of long-term operation was absolutely indispensable, and the air mail law was accordingly amended to provide reasonable assurance of a ten-year period of operation for any holder of a contract.

In order to harmonize the system that had grown by bits, Congress further provided in 1930 for certain extensions of routes. There was nothing covert or ambiguous about the provisions for the extensions, and out of the total of operations at the time of the cancellations only 20 per cent was over routes that had been covered by extensions granted by the Postmaster General. A substantial majority of all operations on Feb. 10, 1934, was covered by contracts that had been let as the result of competitive bidding with two or more competitors.

PAYMENTS EXCESSIVE?

The allegations of improper practices in the making of contracts are supplemented by allegations of waste and of excessive payments under certain contracts or route certificates. The fact is, of course, that the air mail appropriation has always been recognized by all parties, including presumably all members of Congress, as a device for building up and maintaining an air transport system. It has always been recognized as something more than a mere payment for the carriage of certain letters at the payment of so much per letter. In the earliest stages of air transport it was necessary that payments be on a rather generous scale, to cover the risk of entering in an entirely new field and providing the necessary material and organization. As the transport business began to progress, the rates of payment by the Post Office Department were rapidly reduced. They have never been on a large enough scale to permit of the making of any very substantial operating profit by even the most fortunate operators (according to the very careful study made of the income and expenditures of air mail contractors for the House Post Office Committee by a special investigator a year ago), and for a very large part of the air mail system there has actually been a net loss over a considerable part of its history. The Post Office Department has made frequent and drastic reductions in the amount paid for carrying the mails, as is shown forth statistically in the pages in this issue that are devoted to reviewing the general record of air transport. When it is suggested now that less than half as much money need have been spent if payment had been made only for service actually rendered, the point is overlooked that upon those terms it would have been impossible to induce anyone to start proper air transport lines or to operate them on a proper basis. The actual saving under any such heroic policy as that would have been not a mere 50 to 60 per cent, but almost 100 per cent, for most of the air transport lines would have gone out of business and would have ceased either to receive any pay from the government or to render any service to anyone. That observation applies to the general suggestion that substantial savings could have been made on the system as a whole under some imagined set of conditions, and it applies also to the collateral suggestions that excessive payments have been made on certain individual routes. In one case the scale of payment suggested by the Postmaster General would have been equivalent to requiring an operator to carry the mail over a route where very little passenger traffic was available at a gross payment of 4½ cents a mile.

AVIATION AND THE BULL MARKET

May it finally be suggested, before turning to more general observations upon the relations between governments and air lines and the teachings of experience concerning the development of air transport systems, that public opinion has fallen into a sad fog of confusion concerning the relationship between operating profits of a transport company and profits that were or theoretically might have been made in speculative transactions by certain fortunate or far-sighted individuals. It is no news that there was a bull market in 1929, and that the whole stock market rushed up to heights that can now be seen to have been ridiculously inflated. The aircraft stocks were about as bad as the rest, but no worse than a good many others. Public enthusiasm for the prospects of aviation had arisen, almost without need for promotion or encouragement, to heights that the soundest heads in the industry themselves recognized as ridiculous. As a matter of fact a great many of the "insiders," even among those who were speculatively inclined, were unable to make any substantial amount of money on the stock market in that period because they saw only too clearly the absurdity of the heights to which prices were being pushed, and sold whatever securities they themselves held at a very early stage in the rise. Many of them, including officials of the companies that have been most bitterly attacked in recent months, went further and made public statements warning against the boom psychology then rampant and by implication against the absurd levels to which the prices of aeronautical securities were being driven. *It was during the climactic stages of the boom that an old hand in Wall Street with a special interest in aviation and an expert knowledge of the field remarked to the editor of* AVIATION *that "The present prices of aircraft stocks bear no possible relationship either to the present earnings or the future prospects of most of the companies concerned. They signify simply an apparently insatiable public demand for certain pieces of paper, of which there is only a limited supply and which represent a part ownership in an industry of peculiar romantic appeal." All that had little or nothing to do with the aviation industry, and the industry should not be indicted for prices made by the folly of speculators who in most cases were utterly ignorant of everything connected with aviation and had no inclination to make the effort necessary to learn anything.*

IF WE ARE TO HAVE AIR TRANSPORT

But now we must turn again from the specific to the general, and dig deep into the fundamentals of the problem. There are certain facts that must be borne in mind if America is to have any air transport system at all, and particularly if it is to be under any form of private ownership.

The first of the essential facts is that air transport requires, as most other forms of transportation have required in the early stages of their development and as some of them still do, government assistance. There is every reason to suppose that in the course of a few years we shall evolve out of dependence on anything even remotely resembling a subsidy, and some lines exceptionally favored by passenger traffic have already been carrying the mails at a gross cost to the government no greater than the income from postage, so far as that income can be determined—or, in other words, at no net cost to the government whatever or even at a small profit. Such lines are still, and are likely for the next few years to remain, the exceptions. The general rule is that there must be government support.

NEW CONTRACTS FOR EACH ADMINISTRATION?

That being the case, it is indispensable that some means of allocating support be found. *One point on which we can be immediately clear is the undesirability of periodic reassignment of contracts, or route certificates, or subsidies, or whatever particular documents may embody the government aid. European countries have had an immense amount of experience with the assignment of air transport subsidies on a hand-to-mouth basis, and all the experience has been bad. Without exception the major countries have finally been forced as a result of their trial with other systems to adopt the principle of long-term contracts, running ten years at the very least and in some instances for more than twenty. When the suggestion is made that the thing to do is to let contracts for carrying the mail for a four-year period, and then to re-advertise and re-award them as a result of new bidding, and then presumably after four years more to do the same thing again, it is equivalent to a suggestion that America should have no real air transport system at all.* No one who has the slightest understanding of the dependence of transport flying on ground organization and of the amount of money that has to be spent on perfecting that organization will suppose for a moment that it would be possible to persuade any sensible man to assume the expense of providing the necessary ground facilities and of getting an organization together in the face of the prospect that it would all have to be sold for junk at the end of a four-year period

as the result of the re-award of the contract in other quarters. To adopt any such policy as that would be just exactly as foolish as for a city government to offer four-year franchises for street railway operation with no presumptive right for the recipient of the franchise to continue running after the four-year period has expired, and with a consequent necessity of amortizing the entire cost of laying the track and purchasing equipment over that brief span of time.

A BUYER'S MARKET

No doubt it will be said that if these costs are so high, the group that has once assumed them and that has been running for four years will be assured of being able to underbid any outside competitor when after a very few years the contract is reopened for re-awarding. It is by no means possible to be sure of it. There is always the chance that some entirely new group interested primarily in securing a contract for promotion purposes and as a foundation for the rearing of a financial edifice will offer a bid so ridiculously low that the operator who has to make his operations clear expenses cannot hope to compete with it. *The possibility always exists, also, that an outside bidder may feel that he can go to a very low figure precisely because of his confidence that if he receives the award of the contract he will be able to cut his operating costs by securing both his ground and flying equipment at junk prices from the previous operator, who, after the destruction of the basis upon which his only chance of running profitably reposes, will naturally offer his equipment for sale for whatever it will bring in the only market available. No less distinguished a commentator upon American affairs than Arthur Brisbane has actually suggested the availability of such distress merchandise as a means of reducing costs. Proposing in his column that the Army might undertake the carrying of passengers as well as mail, Mr. Brisbane observed: "And he (the President) might get great bargains in almost new planes for mail and passenger traffic. Companies, unable to operate without Post Office income, might sell cheap." Any such policy of distress merchandising, whether it concerns sales from private operators to the government or forced sales from one private operator to his successor in possession of the contract, seems to us utterly alien to any spirit of fairness and particularly alien to the spirit of NRA.* We can imagine nothing that would be more distasteful to the present Administration than the creation of a situation likely to result in such injustices, and we are quite certain that the Administration has no desire to employ a method of letting air mail contracts which would operate to keep the lines running on a shoestring basis and to prevent their risking necessary expenditures for the installation of facilities that would promote the safety and the reliability and the efficiency of their services.

Before we turn to detailed examination of the precise ways in which the beneficiaries of government aid should be selected, the question of the form that the aid should take deserves at least a passing glance.

Most of the countries of Europe, and in fact practically all the countries in the world except the United States and Canada, have proceeded by giving direct subsidies to aviation. In Canada and in the United States the government has operated rather through awarding contracts for carrying the mails by air. Either system is perfectly feasible if properly handled. Either one is capable of giving terribly bad results if misapplied. Most of the European countries have had more or less extended periods of very unhappy experience with subsidies, as many of the subsidy laws have been so drawn that they gave very little encouragement for the development of a genuine commercial traffic, and in fact in some instances they have positively discouraged it. Some of them by elaborate regulations concerning the bonuses to be paid for various types of equipment have resulted in the development and adoption in transport service of aircraft of characteristics extremely uneconomical or unsafe or both.

PROFITS AHEAD FOR THE GOVERNMENT

A subsidy law can be drawn which will be immune from those drawbacks, and some of the European subsidies are working out in a reasonably satisfactory fashion. On the whole, however, the air-mail contract has seemed a more satisfactory device for aiding aviation in the Western hemisphere, as it has carried within itself the mechanism of the extinction of the subsidy feature. As the mail traffic has increased and as periodic reductions have been made in the payments for carrying the mail, the goal of complete self-support has been steadily approached and in fact has actually been reached on certain routes. It appears that at least two of the routes upon which route certificates are now outstanding as extensions of contracts originally entered into some years ago are actually returning to the government in revenue received from the sale of air-mail postage more money than is paid to the operator of the airlines for carrying the mail. The subsidy in those cases, in other words, has dropped to zero or even been converted into a profit. In a couple of other instances the borderline has been reached and *the air mail is at least very close to being on a basis profitable to the government and very soon would have reached such a basis as the normal result of a normal continuance of the process that has been going on for the past four years.*

POUND-MILE PAYMENTS AGAIN

The suggestion is now being made that the payment to the contractors for handling the air mail should be put on a wholly new footing, and that it should be proportioned to the amount of mail traffic calculated in pound-miles rather than simply to the number of miles flown by the company's mail-carrying planes. A number of bills to accomplish such a change of basic type of compensation has been introduced in Congress, and they have the very strong support of Representative Mead, chairman of the Committee on Post Offices and Postal Affairs. Unfortunately some of the talk about the development of new air-mail legislation has perhaps led the lay public to suppose that the order canceling the contracts was a necessary or desirable preliminary to the revision of the basis of payment and to putting the air-mail service upon a sounder and more consistent economic footing. So far from that being the case, *practically all of the air-mail operators have been quite ready to welcome a change from mileage to pound-mileage payments at any time during the last two or three years. Some of them have been enthusiastic advocates of such a change. The bills now being discussed with the object of revising the air-mail postage downward, of creating new classes of air-mail matter such as the "airgram" or "airbrief," and establishing a flat pound-mileage rate, are very closely similar to the Kelly Bill introduced in Congress in 1933 and regarded with considerable favor, either exactly as it stood or in slightly modified form, by most of the air transport companies.* Even if there had never been a Black Committee nor an investigation nor an air-mail contract cancellation, the adoption of the pound-mileage system of payment would have been a natural development of the very near future, and indeed it has for some time been generally believed by those interested in air transport that that system was the natural one and that it would in due course be adopted with the cheerful acquiescence of all parties concerned.

In this same connection it is worthy of note that whereas the air-mail contractors, and especially the largest of the contract-holding companies, have been subject to much denunciation in the last few weeks because of their "greed" and of their exaction of excessive sums from the government, the largest of all those systems would actually receive substantially more money either under the fixed rates proposed in the Kelly Bill of 1933 or those suggested in the Mead Bill now under discussion than has been paid to that operator during the last eight months under the old system. Another of the very largest operating companies would receive practically the same amount of money under the Kelly Bill as under the mileage payment that has been fixed by the Postmaster General in recent months, and only a little less under the rules promulgated in the Mead Bill than under that which has actually been prevailing.

If it be accepted as proven that there must be government assistance of some kind and that it must be extended on a long-term basis if a proper system is to be maintained, it remains only to be considered how that assistance should be allocated. It is obviously impossible to hold out the offer of government aid to all comers. There must be some discrimination. Under any administration or under any method of awarding contracts that may be used there will be some people or some corporations that will get the contracts and others that would like very much

to have them but will fail of an award. Under any conceivable system involving any degree of private ownership, after the awards have been made and the tumult has died away it will be found that there are still "insiders" and "outsiders," with the latter able in some cases to operate (usually on a very restricted scale) without government assistance because of exceptionally favorable conditions or as a result of paying exceptionally low wages to personnel or of omitting safeguards generally thought to be desirable.

ONE BIG COMPANY

In this respect, also, the experience of all the major European countries coincides with our own. In each of the principal states of Europe, in fact, concentration of the benefits of government assistance has been carried to such a length that there is a single subsidized company, while a number of other small groups run scattered and more or less seasonal services without government help. In Great Britain, for example, in 1922 there were three separate British companies carrying passengers by air between London and Paris and other Continental points, and all of them were subsidized by the government. It became apparent in due course that that was nonsensical, and the government forced all the various interests to get together and to form Imperial Airways. Imperial Airways is a privately owned company, its stock listed upon the London Stock Exchange. Its routes and schedules have been revised and extended from time to time by direction of or in agreement with the government, and the company now receives and has for almost ten years received the entire British transport subsidy. In short, the British Government has made, and a succession of governments of various parties has confirmed, a selection of a particular group of private individuals to operate British air transport. An initial consolidation and subsequent extension of routes have been arranged by governmental direction. In short, the British have done, with apparently general approval, essentially what the Postmaster General here was engaged in doing in 1930, except that he tried as far as possible to retain the competitive system, with the several transcontinental routes independent of each other, and that Congress never gave him powers as extensive as those which the British Government felt free to exercise in dealing with Imperial Airways and its various predecessor companies. The story of air transport in Germany and in France, though differing from that in Great Britain in detail and in respect of the time at which various things have happened, has been essentially the same in its general course.

To return once more to the question of method of allocation, of course the first possibility that occurs to everyone is the use of competitive bidding. We have already mentioned that repeatedly as though it were to be taken more or less for granted. It is as a matter of fact the system that has been used throughout, for approximately 80 per cent of the volume of air-mail operation at the time of the cancellation order was on routes that had been awarded in open competition. In the letting of the 34 domestic air-mail contracts that have at various times been outstanding there were two or more competitors for 24 of the routes, and most of the ten contracts for which there was only a single bidder were short and relatively unimportant. Three of those ten, as a matter of fact, were very shortly cancelled and service suspended.

Perhaps competitive bidding is the best method to use whenever new contracts have to be awarded, but certainly it must be used with some care. It must at all times be remembered that the fundamental object of government assistance is to build a strong and well-run air transport system, and not merely a cheap one. It must be realized that that goal is only likely to be attained by strictly limiting service to responsible and experienced groups controlled by people who give every evidence of their intention of staying in the business, of rendering a constantly improving service, and of taking the fullest possible advantage at the earliest possible moment of every new scientific development. It must be borne in mind that competitive bidding for an airline is unlike almost every other form of competitive bidding in that the figures on the bid submitted are likely to have very little to do with the actual cost to the government of running the service. In this rapidly developing art it would be incomparable folly for the government to tie itself down for any considerable length of time to pay air transport companies at a flat and invariable rate. Some of the European countries have tried to get around that difficulty by letting subsidy contracts on the basis of a specified rate of diminution in the subsidy payable, but that also fails to work out very well because of the virtual impossibility of foreseeing the situation of five or six years hence or the amount or type of assistance that may then be needed in so new and so swiftly changing a field.

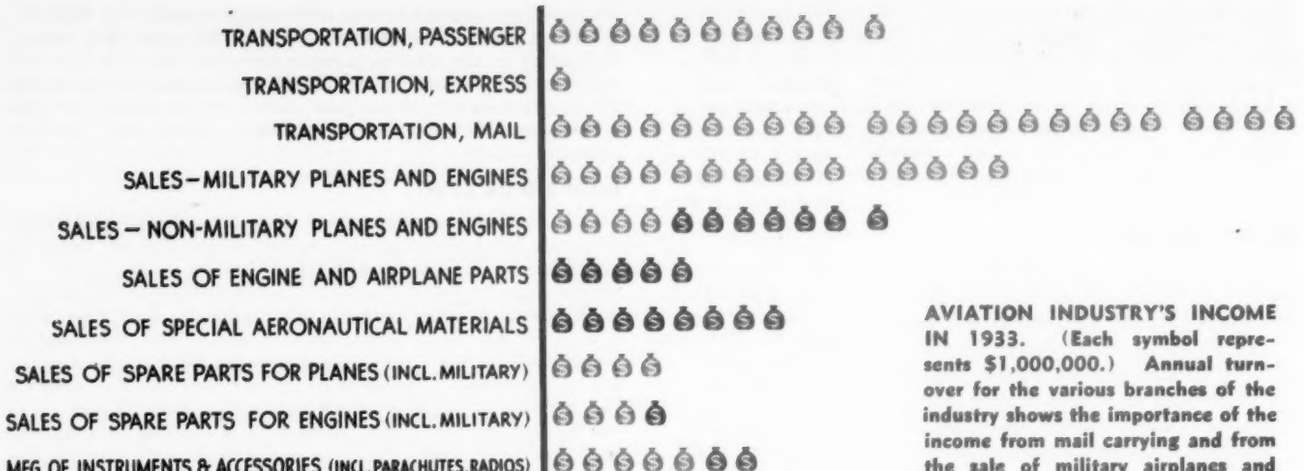
HIGH BID OR LOW?

It is absolutely necessary that there should be administrative discretion somewhere for the periodic revision of the terms of contracts and of the compensation payable under them. It is necessary, in other words, that some agency of the government should be free, within a comparatively short time after a contract has been entered into, to reduce the compensation payable under that contract to below the level of the original bid. Under those circumstances it may well be that, whether the contract is originally awarded to the lowest bidder or to the highest one, the rate of payment after a couple of years will be exactly the same. That as a matter of fact is what has been happening over the last three years. At the time of the cancellation there was not a single air-mail contractor who was being paid an amount even closely resembling that which would have been due under the terms of his original bid, and in practically every instance the rate of payment had been sharply and repeatedly reduced to far below the amount fixed at the time the contract was first awarded. Even from the point of view of simple economy for the government, the major concern in awarding a contract must be with the responsibility and character and apparent ability of the would-be contractors rather than with the figures that they put into their tenders—figures which will within a comparatively short time become meaningless in any event as the result of the development of the art and of the periodic revisions that become necessary in consequence.

Another point to be borne in mind in connection with competitive bidding is that the passage of any kind of a law fixing a uniform scale of payment would appear to make the competitive system in its ordinary form unworkable. If every carrier of the mail is to get two mills per pound-mile, in what form are bids for a new service to be submitted? Or upon what basis is competition to be held? When suitable legislation reorganizing and perfecting the basis of payment has been enacted, it will be more than ever clearly logical that awards shall be made upon the apparent relative responsibility and experience of the competitors and upon the presumed or anticipated qualities of the services that they could severally offer.

COMMISSION CONTROL

There are various ways in which contracts may be awarded, at least as to the first step in the classification of candidates. The first move may be to ask for bids or it may be to shake dice, but in any event **before an award is actually made it is absolutely indispensable that some administrative agency have the fullest possible measure of discretion in deciding which of the proposals is most advantageous, taking everything into consideration, and which is likely to give the best results through all the modifications and revisions and new developments that will be necessary over a long term of years. In the past that administrative agency has been wholly in the Post Office Department. That seems to us a somewhat unsatisfactory state of affairs, and the editor of Aviation has repeatedly argued, both in the pages of this magazine and elsewhere, that the award of government aid to air transport through air mail contracts or otherwise and the fixing of the financial relations between the air transport operators and the government should be put in the hands of a commission of an absolutely non-political nature, its members appointed for long terms. The events of the past month confirm and in fact multiply a thousandfold our conviction that that would have been in the past, would be now, and certainly will be in the future, the wisest course and indeed the only sound one. Certainly it is earnestly to be hoped that a flinging of the whole system into the maelstrom of competitive bidding, with its concomitants of fresh antagonisms and a feverish rush of new airline promotions, can be avoided, and that the Administration's basic purposes can be attained without too violent a rearrangement of the present map—or too vigorous a disruption of the existing organizations.**


TRANSPORTATION, PASSENGER
TRANSPORTATION, EXPRESS
TRANSPORTATION, MAIL
SALES—MILITARY PLANES AND ENGINES
SALES—NON-MILITARY PLANES AND ENGINES
SALES OF ENGINE AND AIRPLANE PARTS
SALES OF SPECIAL AERONAUTICAL MATERIALS
SALES OF SPARE PARTS FOR PLANES (INCL. MILITARY)
SALES OF SPARE PARTS FOR ENGINES (INCL. MILITARY)
MFG. OF INSTRUMENTS & ACCESSORIES (INCL. PARACHUTES, RADIOS)
OPERATION OF FLYING AND MECHANICAL SCHOOLS
TAXI FLYING
AERIAL SURVEY AND ADVERTISING
"HOP FLYING" OR SIGHT SEEING
AIRPORT OPERATION AND SERVICING
SALES OF FUEL AND OIL
SALES OF AIRPORT AND AIRWAY EQUIPMENT

AVIATION INDUSTRY'S INCOME IN 1933. (Each symbol represents $1,000,000.) Annual turnover for the various branches of the industry shows the importance of the income from mail carrying and from the sale of military airplanes and engines. Red symbols indicate money coming in from the outside, while the black figures show that which is circulated within the confines of the industry.

Aviation, A Diversified Industry

A hundred million dollars of annual turnover

GIRTH around the abdomen is not the measure of the greatness of a man, and volume of output does not determine the importance of an industry. As American industries go, the building and operating of aircraft is not among the largest. It falls far short of the billion-dollar class. It employs only a small fraction of a per cent of the country's working population. Yet it is an industry in which everyone is interested. It is an industry of which almost everyone feels that he knows a little, and desires to know more. There is something appealing about this aviation business; there is something that arouses an instinctive curiosity.

Aviation has the appeal that always belongs to the newest and to the swiftest form of transportation, and especially to a form unshackled by fixed pathways—man's latest contribution to the satisfaction of his own wanderlust. It appeals as the living evidence and the growing embodiment of triumph over the last and the most difficult of the natural elements to be invaded and tamed. It holds our interest as the very keystone of national safety, now that air power has become an essential bulwark against national danger. It seizes upon the attention of almost every human being as an instrument of commerce—as an instrument of exploration—as an instrument of sport—at once in the spirit of pure romance and upon the most severely practical grounds.

But it is not romance alone, or military and commercial uses alone, that make aviation interesting to business men. It has the straightforward industrial significance of an industry that already presents a score of different faces, draws its supplies from a hundred different sources, and promises a growth that will not stop short of attaining the front ranks of industry in due course.

Speculation upon the future must play small part in a statistical report. Upon these pages, and many pages that follow, we have set ourselves to make a record of the progress of American aviation. We fix our attention not upon what it is to become but upon what it is today. And although the aviation industry is not among the loftiest members of the industrial family in stature, even upon size alone there is no occasion to apologize for it. In round numbers, American aviation represents a commercial activity of $100,000,000 a year.

By the money-bags illustrated on this page, the hundred millions have been diagrammatically traced. They have been subdivided by fractions of the industry and by the nature of the activities upon which they are set, and subdivided again in terms of the source from which the money comes. In rating the volume of business done by any industry or group of industries, it is necessary to make a very careful discrimination between the money that comes in from the outside, and that really gives the industry its livelihood, and that which is simply passed around within the ranks. The aviation industry, perhaps more than any other, needs to take to heart the lesson of what happened to the town where all the inhabitants lived by taking in each other's washing. During the latter stages of the late departed boom a large part of the industry was

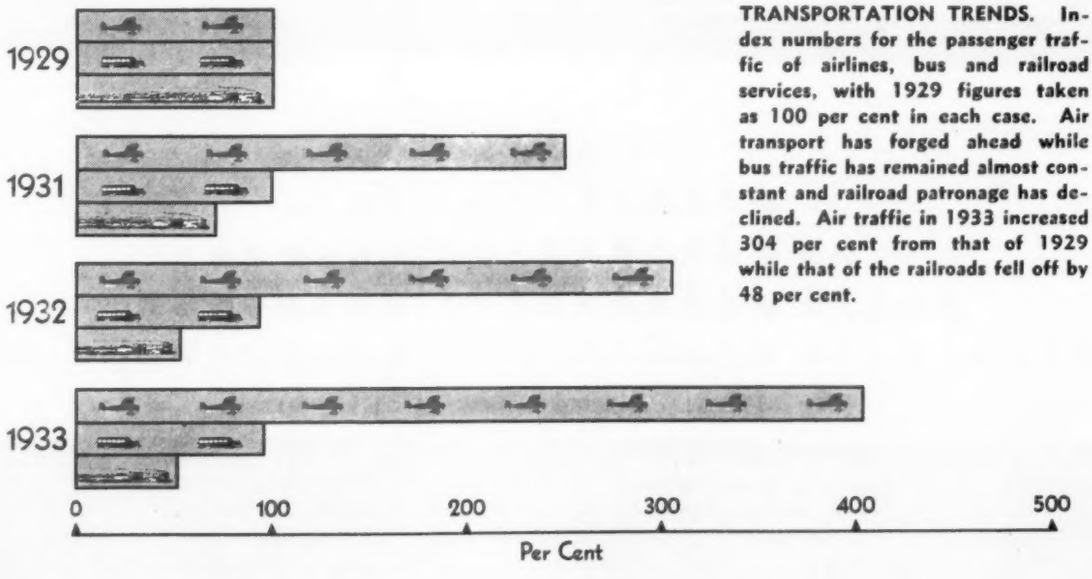
engaged in selling to itself, and that is a process that soon becomes unworkable. If the air transport lines were the only purchasers of aircraft, and if nobody but the employees of the airplane companies rode on the airlines, it would be only a question of a short time until both the airlines and the factories were wound up through exhaustion of their capital. The airline must have a large proportion of customers who made their money out of something totally unconnected with aviation, or the factory must find purchasers for a good part of its product outside the aeronautical circle, or both. The real index to the size of any industry is found in the amount of money that comes into it from the outside.

It is for that reason that we have discriminated with such care. In drawing up our diagram we have built an imaginary wall around American aeronautical activity as a whole. As a fundamental condition of our survival there must be a steady flow of dollars inward and of goods and services outward across that wall, and we have counted the dollars that cross it and given them the place of honor in our picture. From the point of view of an oil company, there is nothing to choose between the sale of gasoline to the owner of a private airplane and the same sale to the owner of a flying school—assuming that their checks are equally good. From the point of view of the industry as a whole, however, there is a marked difference. The order from the private owner is primary, and the bill is paid with money directly derived from outside of aviation. The order from the flying school is secondary, and in order that the bill may be paid at all another sale (the sale of flight instruction to a student) must be arranged.

With all this lengthy explanation cleared away, we can look at the chart and its red and black money-bags and consider their meaning. We can consider, too, the ultimate destination of this $77,000,000 that comes into the industry from the outside world. Roughly speaking (though as accurately as can be determined from the existing records), $29,000,000 goes directly to labor employed by air transport lines, aircraft manufacturers, and operators of airports and of flying schools and the like. Another $28,000,000 is laid out for supplies and materials, including such accessory products as fuel and oil. About $10,000,000 goes into the salaries of a widely distributed technical and administrative staff within the aviation industries. Approximately $4,500,000 represents the net profit of the industry as a whole. The remainder covers taxes, interest on loans, rent, and a variety of other matters. If the expenditures for supplies and materials were actually to be traced to their ultimate destination at the point where the ore that was eventually to be part of an airplane engine came out of the ground, it would be found that about 60 per cent of aviation's total income goes to labor at one point or another, that nearly a third of the remainder is paid out to salaried personnel receiving salaries of $7,000 a year or less, and that taxes consume a substantial proportion of the residual 25 to 30 per cent.

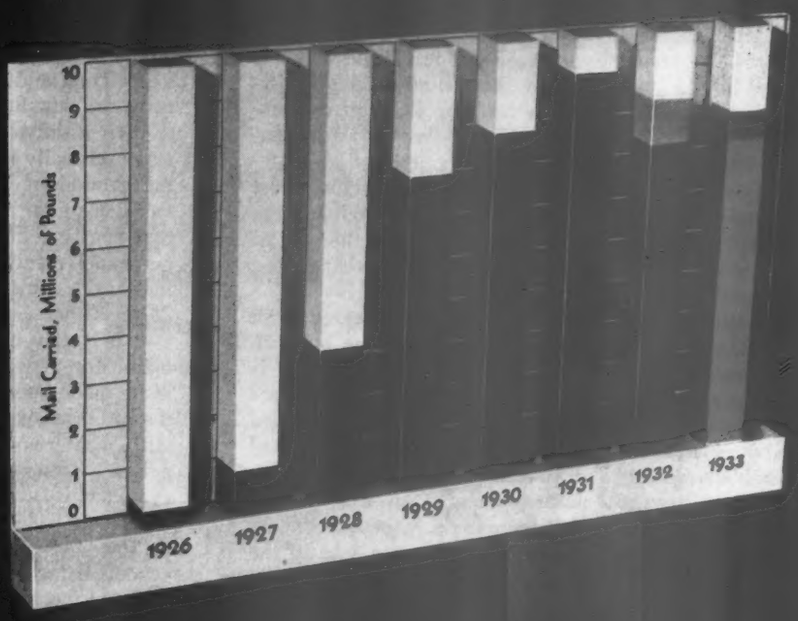
It is hardly necessary to explain items of the diagram in detail, for they speak for themselves. If a comparison were to be made between this chart and a similar one drawn for two or three years ago, it would be apparent at every turn with what remarkable success air transport has withstood general economic catastrophe—a success of which more evidence is given on the immediately succeeding pages. Whatever is dependent upon private and industrial aviation, on the other hand, the operation of airports and of flying schools being good cases in point, has fallen off badly. Fortunately there is now every reason to think that the fall has reached its lowest point and that the turn has arrived, and that items that now cut a very small figure on the diagram of aeronautical income will catch their stride and begin to proliferate their million-dollar symbols across the page for the diagrams of a year or two hence.

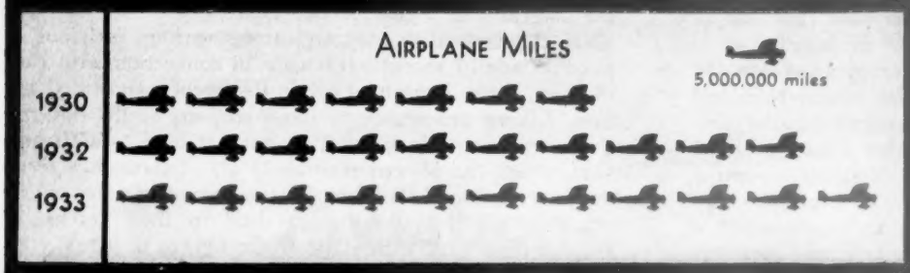
Of the factors that control these various divisions of aviation and of recent experience in connection with each of them, there is much to say in the twenty pages that follow. Giving precedence to those sections of the industry that predominate in volume, we turn at once to air transport, which has plowed resistlessly ahead through a series of years in which an economic tidal wave has stopped all other forms of transportation dead in their tracks, or thrown them back with static traffic figures or actually receding ones. How different a story is to be told for aviation our index numbers of passenger travel by air, rail, and highway make plain.



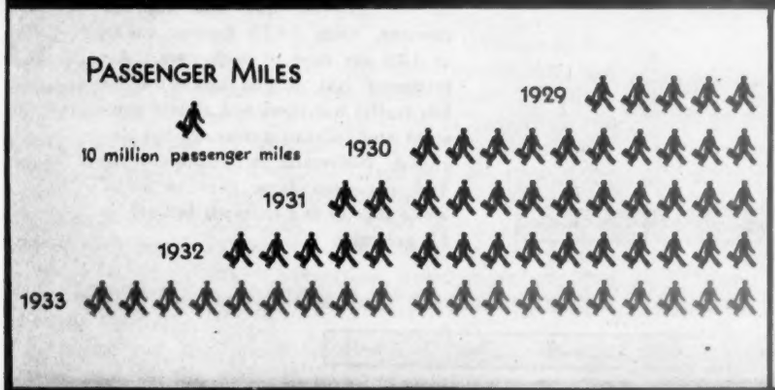
TRANSPORTATION TRENDS. Index numbers for the passenger traffic of airlines, bus and railroad services, with 1929 figures taken as 100 per cent in each case. Air transport has forged ahead while bus traffic has remained almost constant and railroad patronage has declined. Air traffic in 1933 increased 304 per cent from that of 1929 while that of the railroads fell off by 48 per cent.

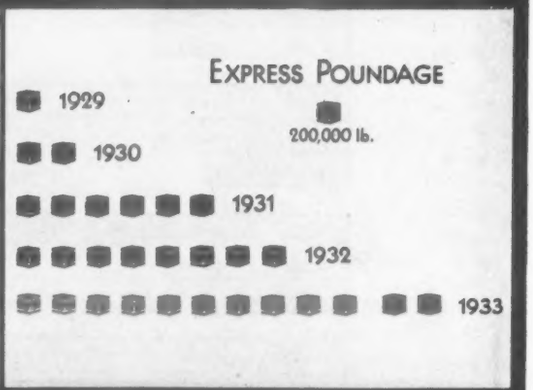
AIR MAIL POUNDAGE. The actual poundage figure of 7,360,000, as indicated by the dark portions of the 1932 and 1933 bars, was nearly the same for both years. A further reallocation of the transcontinental mail in 1933, however, resulted in a slight drop in the approximate poundage figure that would have been recorded under the old system of accounting, as indicated by total lengths of bars including the tinted sections. The slight decline is more than fully explained by the increased postal rates made effective in July, 1932. It was then that the previously continuous upward trend reached the turning point.



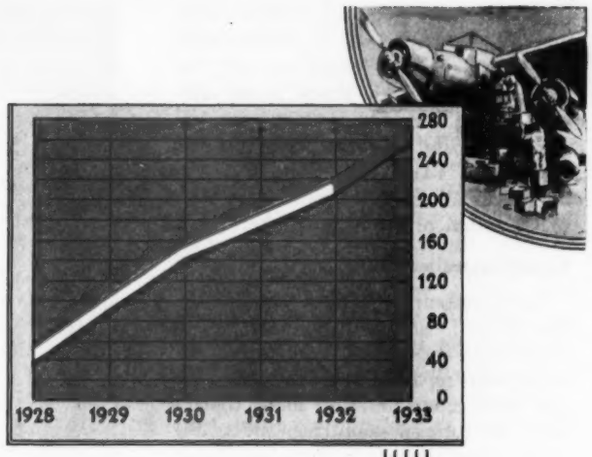


TRANSPORT MILEAGE. The percentage increase in mileage flown in 1933 over that of 1932 was less than that of passenger mileage, proving a marked increase in traffic density and public patronage. The figure for 1933 was 54,642,545 miles as compared with 50,932,967 miles in 1932, an increase of 7 per cent. American transport planes have been flying a distance equal to circling the globe once every four hours, day and night, throughout the year.





PASSENGER MILEAGE AND EXPRESS. American airlines flew 198,800,079 passenger miles in 1933, an increase of about one-third over the figure for 1932 and nearly 2 per cent of the long-haul railroad traffic for the year. Air express has gained substantially having reached a total of 2,452,812 lb. for 1933, an increase in poundage of 53 per cent over the 1932 record.



Transport Goes Steadily Forward

Dependence on the air mail appropriations rapidly reduced

Defying depression, competition of highly developed surface transportation, rapidly decreasing governmental support, and tremendous development expense, American air transport has forged forward and upward in miraculous and unparalleled growth. The index in the upper right hand corner of this page serves to summarize the progress, taking into account such major factors as passengers, express, and mail traffic, efficiency of operation, and mileage flown.

The text for this section and for all those which follow was in preparation at the time of the air mail cancellation order and it has not been modified. We have discussed the cancellation order and its effects elsewhere, but our statistical analyses relate to the normally functioning transport system of Jan. 31, 1934.

THE STORY of air transport in 1933 can be comprehensively summarized in two words—everything up. More miles flown, more passengers carried, more miles per passenger for the average traveler, more express, more safety, more speed, more comfort—more everything except air mail and expense to the government. The air mail poundage dropped off by a few per cent from the figure of the previous year, owing to the imposition of the new and increased postal rates which were effective all through 1933 and had influenced the figures only in the latter half of 1932. As for government outlay, that was cut very drastically by decision of the Congress and of the President.

As in 1932, the most striking progress was in passenger traffic. It has practically doubled in the past three years, and on the whole it has shown a steadily increasing rate of gain. The total passenger miles of traffic on airlines under the American flag were increased by 16 per cent in 1931 over 1930. The next year was 22 per cent ahead of 1931. In 1933 there was a new increase to 36 per cent above the 1932 rate. Not for four years had there been so large a relative advance over the previous year.

To put the gain in other terms, in 1929 the American airlines handled traffic of about one-third of one per cent of the long-haul traffic (trips of over 100 miles) of the American railroads. For 1933 the proportion was up to almost 2 per cent, and if we were to depart from the broad statistical outlook to make individual surveys we should find many hundreds of business men, constantly traveling, who make 50 per or more of their trips by air.

Higher commercial efficiencies

The increase in total mileage flown was much less striking than that in passenger traffic—only about 7 per cent over 1932. The number of passengers per plane increased to about 3.6. Lumping all services together, the average American transport plane has approximately ten passenger seats. The "commercial" efficiency for the year was 36 per cent for the American air transport system as a whole, but for the main trunk lines operating between principal centers of population it was much higher than that, and for protracted periods during the season of peak loads bookings had to be made several days ahead to have a reasonable chance of securing a seat.

Air mail fell off slightly, the explanation being, as already noted, in increased rates. The outstanding feature of the year so far as air mail is concerned, however, was not the variation in poundage but the rapid approach of air transport toward complete self-support and independence of any sort of a subsidy or of any financial assistance from the government, direct or indirect. For the four months from July to October, inclusive, the total payments to all contractors for handling the air mail were but 2.7 mills per pound-mile, as against an income to the Post Office Department from air mail postage commonly estimated at two mills per pound-mile. The United Air Lines system was receiving from

the Post Office but 1.68 mills per pound-mile, the entire Transcontinental & Western Air system but 2.03, the Chicago-New York route alone only 1.15. On the common assumption regarding postal revenue, United Air Lines and TWA were handling the mail over all their routes at very near to an actual profit to the government.

Heavily-travelled routes

In a system of airways that laces the United States from Bangor to San Diego and from Miami to Seattle, with three separate spurs into Canada and with extension into more than a score of foreign countries, the traffic is far from uniformly distributed.

Upon the map of traffic density the influence of the Chicago exposition and of the tremendous travel to and from Washington during the summer in connection with the affairs of NRA and AAA are quite apparent. As for several years past, the New York-Washington route has shown the heaviest travel, holding an average of over 100 passengers a day. Though there are no statistics permitting of a positive direct comparison, it is probable that the air travel between New York and Washington during the year was more than 10 per cent of the number of passengers occupying seats in Pullman cars for the same trips. The New York-Chicago run came next in density, with 99 passengers per day. The total of all the alternative routes between Los Angeles and San Francisco shows 60, and the route to the westward out of Chicago to the Pacific Coast carried an average of 39 passengers per day over its full extent.

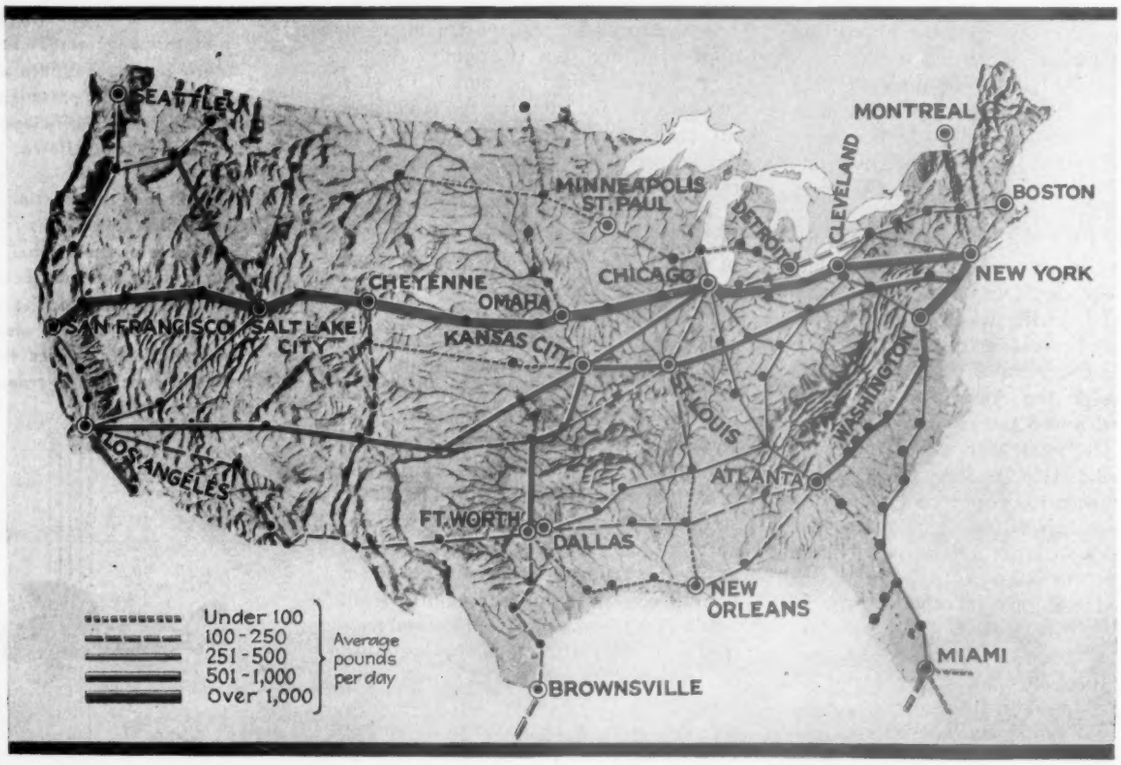
American transport overseas

Statistics for foreign travel on American airlines are not broken down to permit so elaborate an analysis, but about 40,000 travelers left the United States or re-entered it by air during 1933, along with some 160,000 lb. of mail and 650,000 lb. of express. The effect of this foreign service upon the prosperity of American industry cannot be exactly defined, but government departments, such organizations as the Foreign Trade Council, and individual exporters have united in declaring it immense.

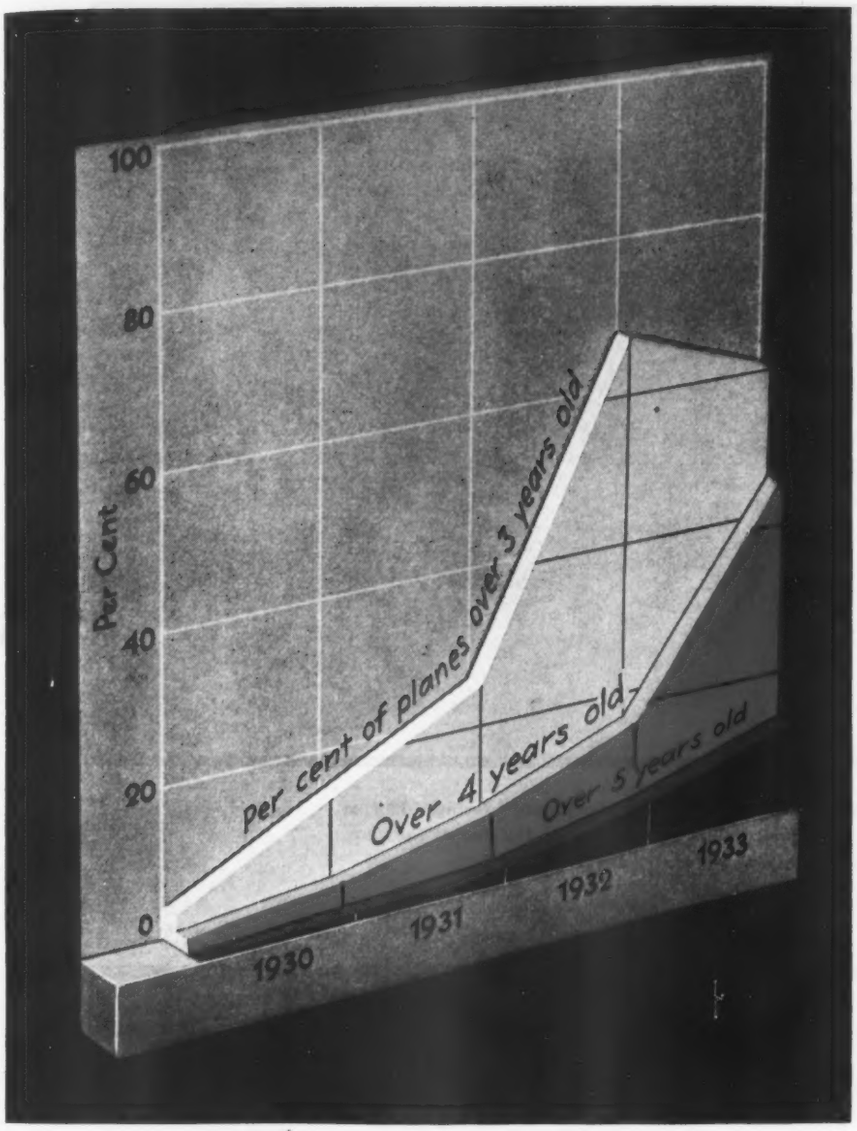
Another element not strictly susceptible to statistical treatment, yet one of which some mention should be made in connection with the statistics of traffic and of extent of service and of cost to the government and the like, is speed. Eighteen months ago the typical cruising speed on American airlines was 120 m.p.h., and only in a very few instances was that exceeded. At the beginning of 1934 approximately half of the daily schedule mileage was being flown with machines cruising at 150 m.p.h. or better, and orders already placed assure that by the end of this year or the very early part of 1935 substantially more than half of the total mileage will be flown at over 150 m.p.h. *By the end of this year, if the present air transport system is left undisturbed and allowed to develop normally, it will be possible for a dweller of any city in the United States of over 100,000 population to reach any other such city in the United States within 30 hours.*

New equipment coming

To rate the speed of air transport statistically by determining the maximum speed of every machine on the transport lines and averaging them all would be comparatively simple, but it would be very misleading at a time when a general replacement of equipment is in process and when a considerable number of planes, obsolescent because of their limited performance and high operating cost (though still capable of giving perfectly safe and reliable service), are still carried on the books and to some extent used. The equipment situation on the airlines is shown in two charts on page 73. Incidentally, they explain one of the reasons why the present period is particularly critical for air transport and why it is particularly important that any abrupt action to prevent the transport lines from proceeding with commitments for the purchase of new airplanes should be avoided. A

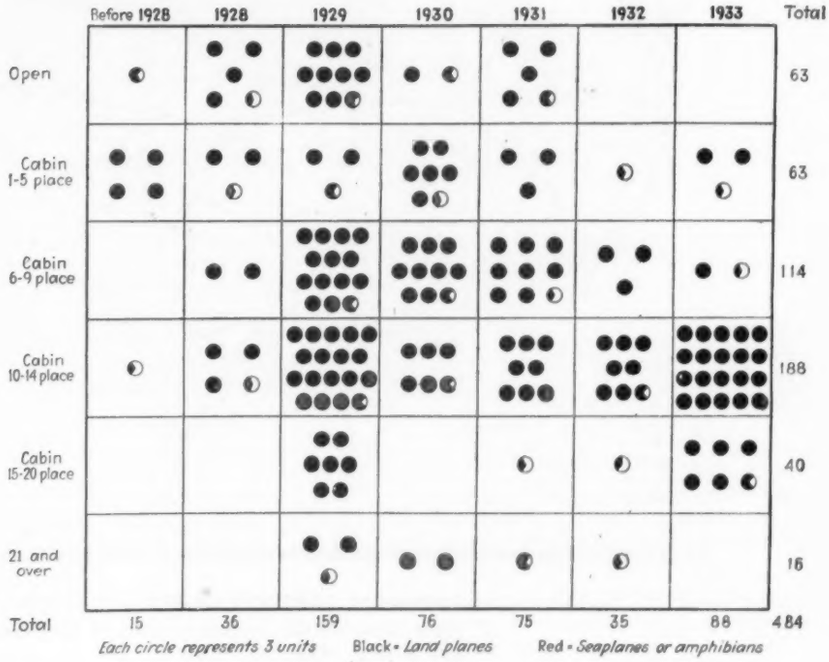


AIR MAIL DENSITY FOR 1933. As in previous years, the through transcontinental routes show the heaviest patronage.

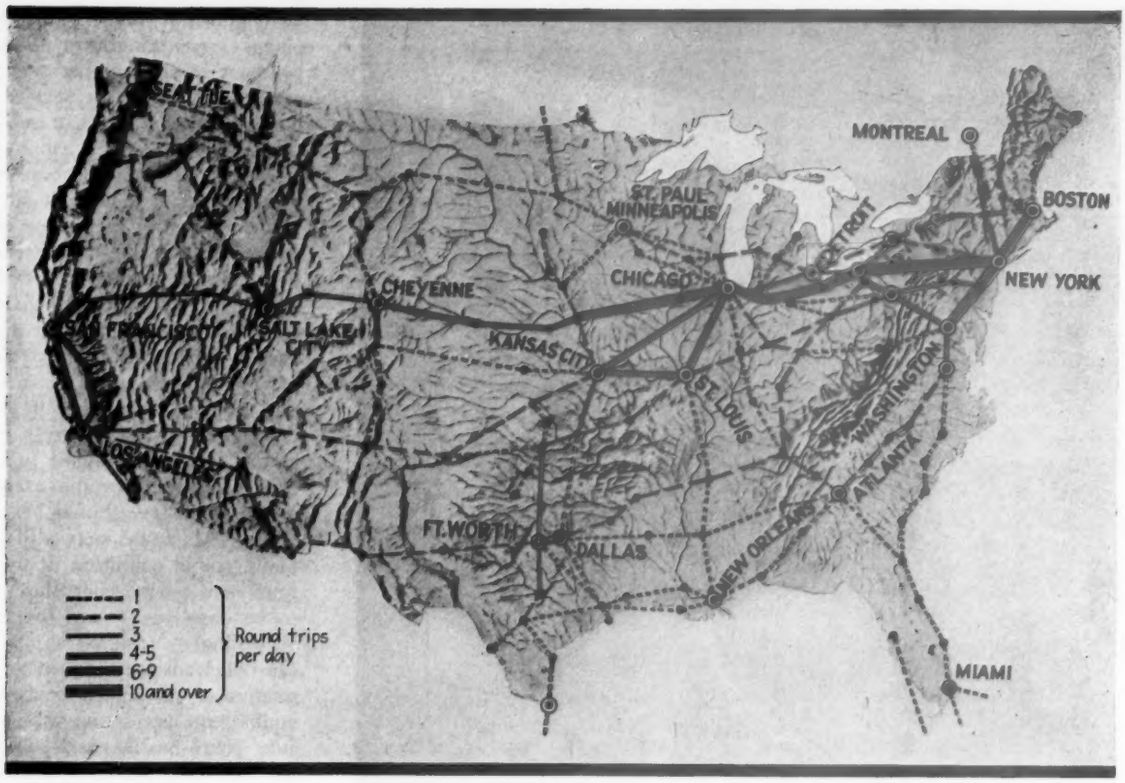


AGE OF TRANSPORT PLANES (above) Nearly one half of the transport planes in service are more than four years old and therefore ready for replacement at the end of 1933. Although airplanes are quite capable of giving safe and reliable service beyond the four-year period, they are inefficient and uneconomical to operate as compared with the more recent products of research and development.

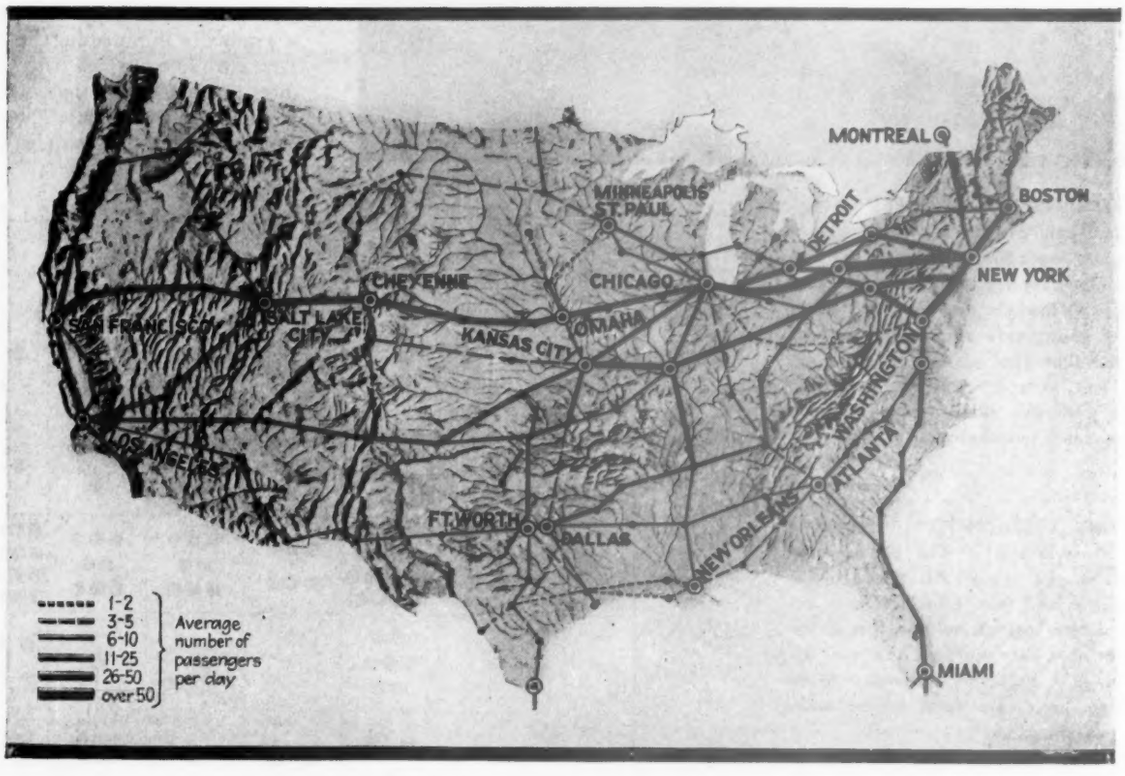
tremendous number of transport planes were bought in 1929, and 60 per cent of the number then acquired are still available for service, the rest having been scrapped or sold for non-transport use. As a more and more intensive and efficient use of equipment has made it possible for the lines to do a steadily increasing amount of flying without increasing the number of planes in service, the craft bought in 1929 have continued to carry the major part of the burden through the succeeding three years with only a very small number of replacements or additions. The normal life of a transport plane, with progress continuing at the rate which ought to be considered as normal in the early days of a new industry, should be about four years. Machines may still be in perfectly sound condition at the end of a four-year period, but they are likely to be obsolescent, and their operation accordingly relatively uneconomical. On that basis there ought to be a turnover of about 25 per cent per year in equipment, yet in no one of the last four years has as much as 20 per cent of the existing equipment been replaced The result is that almost a half of all the airplanes owned by the transport lines are now more than four years old and ripe for immediate replacement. At least 225 new machines ought to go into service within the next two years, and if the government will continue to extend a modest and a gradually diminishing financial support for air transport it is safe to predict that at least that number will actually be bought and put into use. Orders for approximately 100 planes



TRANSPORT DISTRIBUTION (type and date of manufacture). The replacement programs of the major American transport operators and their effects on production are shown impressively in this chart. Transports of earlier vintage, however, are still giving satisfactory service. Open planes have gone into total eclipse since 1931.



DAILY SCHEDULES. Maximum frequency during 1933 of passenger transport services in operation at the end of the year. Seven transcontinental round trips were made daily.



PASSENGER TRAFFIC DENSITY. The width of line for each route indicates the average number of passengers carried each day during 1933.

for the earliest possible delivery are already on the books of the manufacturers.

Planes more intensively used

Passing remark has already been made on the success that the transport companies have had in getting more and more service out of a constant or even a gradually diminishing amount of equipment. The total number of airplanes owned by American air transport companies today is about 15 per cent less than the number three years ago, yet the volume of operation has increased by more than a half within that period. That of course is one of the master-keys to economy, and so to independence of government assistance. During 1933 for the first time, the average distance flown for every plane owned by a transport line exceeded 100,000 miles. For certain of the larger companies the average was over 150,000 miles per airplane. The American performance, whether compared with aviation elsewhere or with other types of transport at home, is absolutely in a class by itself.

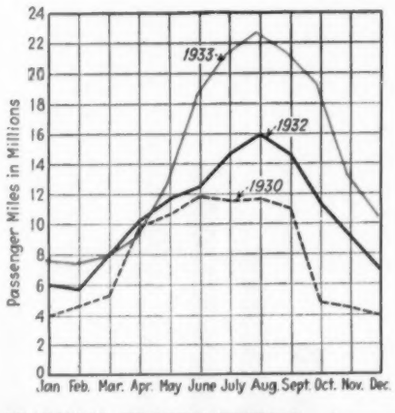
Intensity of operation is still restricted by inclusion on the list of such a large amount of more or less obsolescent equipment, and if the modernization and turnover of equipment is completed within the next two years, as it normally should be, the annual national average by the end of that time should be well over 160,000 miles per airplane and may even exceed 200,000. Individual planes of strictly modern types have already been operating over protracted periods, in some instances, at a rate of more than 30,000 miles per month.

Government support essential

In the light of seven years' experience, it is hardly possible to emphasize too strongly the importance of the government's air mail policy to air transport. It must be frankly recognized that a proper air transport system, manned by well-qualified personnel and with a proper ground organization to insure the safety and the reliability of the service under all sorts of conditions, cannot for the time being be made entirely self-supporting on passenger traffic alone. Every country in the world has learned that lesson, and every one of the major states and most of the minor ones have given air transport some sort of direct assistance. In this country the assistance has come through air mail contracts, and with the growing popularity of the service and with steady improvement in the inherent economy of its equipment and the efficiency of its methods its dependence on government help has steadily declined. Some measure of that dependence, however, still remains, though certain lines have now reached the point of receiving from the government in payment for the carriage of mail no more than the Post Office Department itself receives from air mail postage. The present indication is that within another three years at most the nation's whole air transport system will have reached that happy state, provided of course that in the meantime it is not burdened with further routes carrying an insignificant traffic and started in response to political pressure. Within a few years after that the position of the airlines should be strong enough so that they can get along on passenger and express business alone, perfectly indifferent as to whether or not they carry the mail on any terms. For the present, however, it must be recognized that no such condition has been attained. If direct evidence of that

MAIL CARRIED IN 1933

	Miles of service		Total weight of mail dispatched (pounds)	Average compensation per mile flown	
	Scheduled	Actually flown		1932	1933
American Airways					
1. Boston-New York	335,849	270,881	89,350	0.49	0.39
2. Chicago-Memphis	611,226	563,413	61,299	0.56	0.40
20. New York-Fort Worth	2,885,701	2,628,846	394,165	0.55	0.45
21. Dallas-Galveston	236,088	224,983	29,239	0.49	0.50
22. Dallas-Brownsville	402,751	392,072	85,426	0.54	0.44
23. Atlanta-New Orleans	313,716	307,588	64,025	0.46	0.47
24. Chicago-Cincinnati	428,882	390,638	66,143	0.50	0.36
27. Bay City-Chicago	1,493,326	1,303,347	132,524	0.43	0.41
29. New Orleans-Houston	235,908	234,497	33,852	0.46	0.47
30. Omaha-Atlanta Pt. I	1,156,119	1,066,757	161,008	0.52	0.43
33. Atlanta-Los Angeles Pt. I	3,063,428	2,992,493	345,684	0.64	0.46
Total	11,162,994	10,375,515	1,462,715	0.56	0.44
United Air Lines					
3. Chicago-Dallas	1,815,734	1,721,742	363,021	0.57	0.45
5. Salt Lake City-Seattle	1,242,887	1,202,654	229,328	0.60	0.46
8. Seattle-San Diego	1,892,902	1,824,918	389,396	0.55	0.45
17. New York-Chicago	2,795,033	2,537,242	1,062,737	0.56	0.35
18. Chicago-San Francisco	5,075,457	4,878,906	1,109,525	0.67	0.45
30. Omaha-Kansas City Pt. III	108,648	107,012	20,862	....	0.48
Total	12,930,661	12,272,474	3,174,869	0.61	0.44
Western Air Express					
4. Salt Lake City-San Diego	1,045,087	1,024,877	191,502	0.51	0.50
12. Cheyenne-Albuquerque-Amarillo	569,846	547,864	107,298	0.51	0.41
33. Albuquerque-El Paso Pt. II	109,890	107,892	7,933	0.63	0.39
Total	1,724,823	1,680,633	306,733	0.52	0.46
Transcontinental & Western Air					
34. New York-Los Angeles-San Francisco	6,511,464	6,180,378	1,114,496	0.70	0.44
Eastern Air Transport					
19. New York-Miami	3,089,923	2,985,263	646,951	0.49	0.44
New York-Atlanta	524,970	493,484	136,037	.....	0.35
Atlanta-Jacksonville	103,976	102,201	10,528	.....	0.24
Total	3,718,869	3,580,948	793,516	0.49	0.42
Northwest Airways					
9. Chicago-Pembina Pt. I	1,700,081	1,622,911	229,326	0.55	0.45
Kohler					
9. Milwaukee-Detroit Pt. II	298,218	269,187	14,250	.....	0.35
Pennsylvania Air Lines					
11. Washington-Cleveland	950,247	802,757	195,149	0.40	0.39
National Parks Airways					
26. Great Falls-Salt Lake City	737,916	723,843	53,491	0.48	0.39
United States Airways					
30. Kansas City-Denver Pt. II	401,024	394,231	18,326	0.32	0.34
Total	40,136,297	37,902,622	7,362,872	0.57	0.435



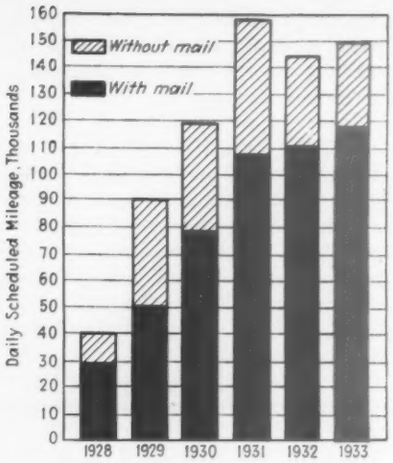
SEASONAL TRAFFIC TRENDS. A comparison of three years of transport operation shows a general similarity in the curves. Air travel is still much more popular in warm weather than in cold. The very sudden rise to the 1933 peak can be attributed largely to the Century of Progress Exposition in Chicago.

is sought, it will be found in the records of attempts to operate airlines without mail contracts.

Subsidies?

To appreciate the real financial situation of American air transport, the picture of rows of coins on page 77, which shows the average rate of payment by the government to air mail contractors, has to be read in conjunction with the chart of air mail income to the government elsewhere reproduced. A very loose and scandalously misleading practice of speaking of the entire air mail appropriation as a "subsidy" has become common within the past couple of years. Nothing could be more ridiculous. The air mail appropriation as a whole is no more a subsidy than the appropriation for transporting mail by railroads as a whole is a subsidy to the railroads. Whether or not any part of the air mail appropriation is properly to be considered as a subsidy to air transport under present conditions is an open question, since the lines on which the government loses the largest amount of money are those in which the air transport industry as a whole has least interest and which in many cases have fairly been forced upon the operators in response to the demands of certain groups of communities for the benefits of air mail. The subsidy in those cases seems to be to the communities concerned, not to the transport companies. As has already been noted on a couple of occasions (but it cannot be too often repeated) the main trunk lines are now handling the mail substantially without net cost to the government, according to the commonly accepted basis of appraisal of air mail income, and in those instances the term "subsidy" is obviously and grotesquely out of place.

If we are to talk of subsidies at all, it must be with the net cost of air mail, or the excess of the expenditure on the whole system over the governmental income from the whole system, that we are concerned. The gross cost to the government, paying no attention at all to income, has not only been steadily reduced, but reduced at a constantly increasing rate. In 1929 the air mail operators were being paid an average of over $1 a mile for carrying mail in single-engined open-cockpit planes which might have no passenger accommodation at all or might provide for one or two passengers in a somewhat cramped position if it happened

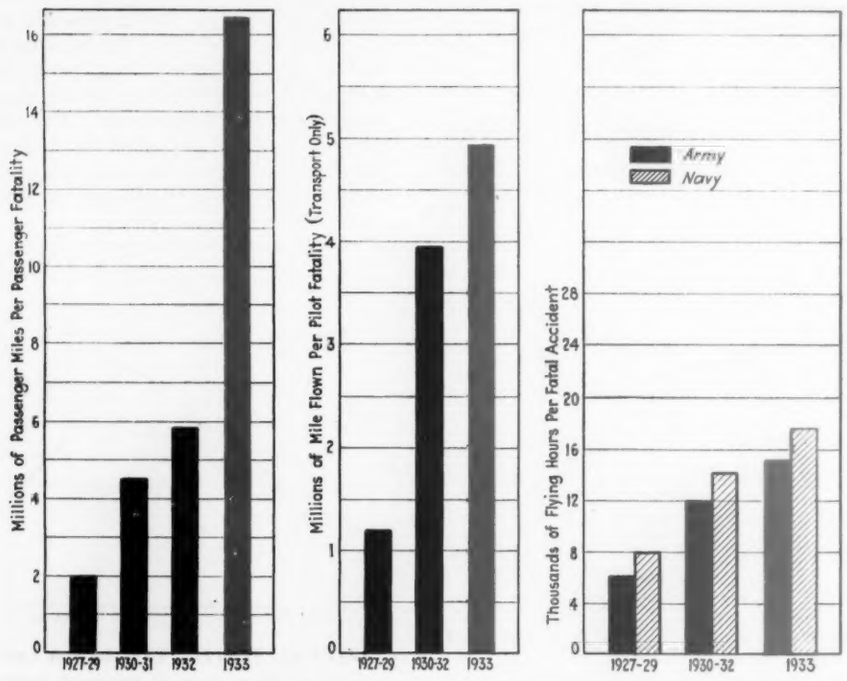


DAILY TRANSPORT MILEAGE. As a result of additions to transport services in 1933, the daily scheduled mileage has increased to 150,089—4.2 per cent above that of 1932. The proportion flown with mail remains high, 80 per cent of the total.

End of 1929

End of 1933

AIR TRANSPORT BY CARGO. Before the passage of the now famous McNary-Watres act, in 1929, a relatively small proportion of transport planes carried both passengers and mail. At the end of 1933, 71 per cent of the passenger and mail routes carried passengers and mail in the same airplanes, while services carrying passengers or mail alone have decreased relatively, to a very marked degree.



AVIATION SAFETY. The average passenger hazard on American airlines decreased in 1933 to one-eighth the average for the period from 1927-1929. There has been nothing in the whole history of air transport, at home or abroad, to parallel the American figure for 1933. Pilot safety in transport operation increased proportionally. Although fundamentally more hazardous, the flying of the Army and Navy has also shown steady improvement in safety.

that there was room left for them after the mail had been loaded. At the end of 1933 the mail was being flown 40 per cent faster and with a substantially improved regularity and reliability, using multi-engined planes having luxurious passenger cabins, at just one-third the gross cost to the government that prevailed four years earlier.

At the same time the net expense to the government, or difference between outlay and income has been cut down from a little over 75 cents per mile flown on the domestic routes in 1929 to 39 cents for the year 1932, and to 19 cents at the end of 1933.

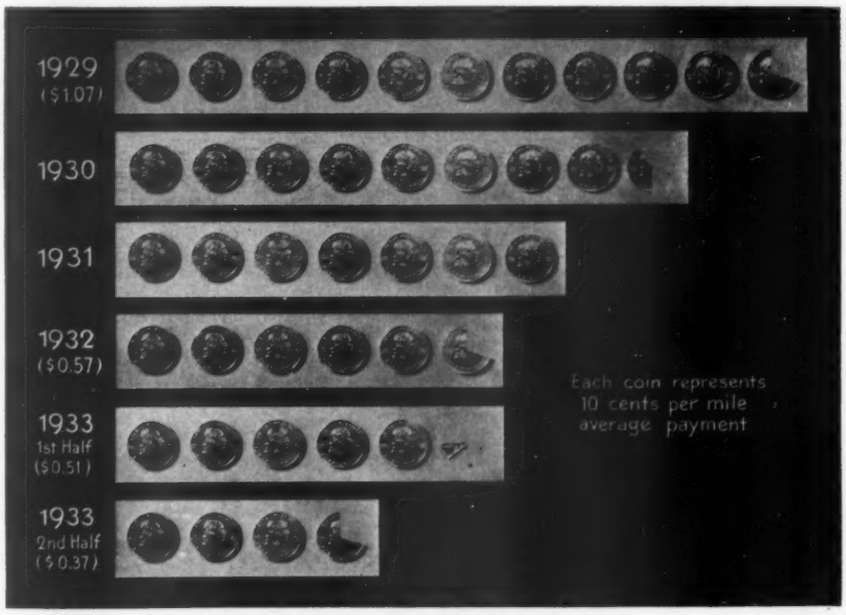
New safety records

. The subject of air transport must not simply be abandoned without mention of regularity and safety in service. Upon both headings continued research, the increased skill gained through increased experience with personnel, and the introduction of improved equipment are showing their effects. Following a number of years in which the percentage of scheduled air mail mileage flown hovered around 92.5, the percentage of performance was increased in 1932 to 93.7 and in 1933 to 94.4. In the course of two or three years the amount of mileage cancelled on account of weather has been reduced by a fourth. Blind-flying studies are bearing fruit.

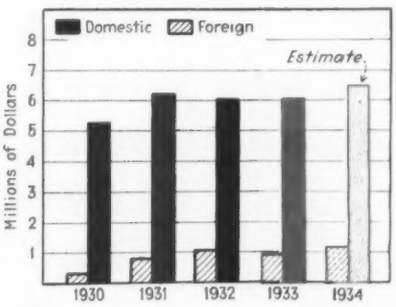
In respect of safety, the relative improvement is far more spectacular. In 1929 the safety records of American air transport were already being established with the best that were being made by the most carefully and efficiently and conservatively operated lines in Europe. In 1932 the number of passenger-miles flown per passenger fatality was more than twice as high as in 1929, and in 1933 it was substantially more than double the 1932 level—practically a six-fold improvement made in four years. *On the basis of the 1933 statistics, an airplane passenger could make a round trip across the continent every month for fifteen years and only have one chance in twenty of meeting with serious accident.*

At the same time the pilot safety record has been substantially improved. Pilot safety always lags a little behind that of the passenger, as the protection of the traveler is necessarily paramount, and in particularly bad weather the pilot may go out with the mail and a parachute while the passengers are left on the ground. Nevertheless, the fatality rate among pilots was brought down in 1933 to the extraordinarily low level of one for every 5,000,000 miles, or roughly one fatality for every 40 years of full-time flying.

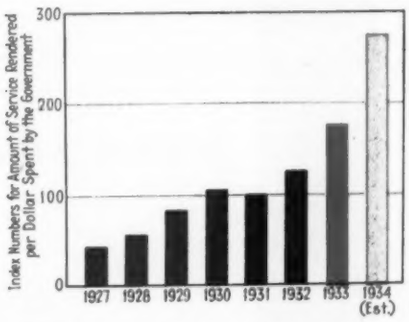
In so brief a review of the record of progress of air transport it has been possible to hit, either by chart for by tabulation or by textual discussion, only a few particularly high spots. Hitting those few as hard as we could, we have nevertheless had to neglect many others almost if not quite as striking and as important. Some indication has been given through the selection and discussion of a few typical sets of data, of the magnitude and the efficiency of our air transport system, of the rapidity and soundness of its growth, and of the reason for its economic background. It is a system that gives employment to some 6,000 men and women, including approximately 600 of the finest and most highly trained pilots in the world, approximately 1,600 specially qualified mechanical personnel, and large numbers of specialists in radio, meteorology, and a variety of other applied sciencies. Employing 6,000 people, it serves the interests of $125,000,000.



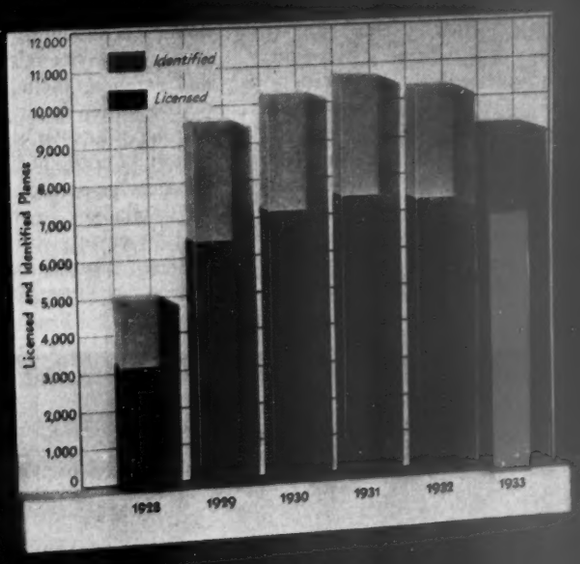
PAYMENT TO DOMESTIC AIR MAIL CONTRACTORS. In the face of ever decreasing compensation per mile, the operators have increased their schedules and speed and provided larger and more comfortable flying equipment. From $1.07 in 1929, the payment per mile has decreased to $0.37 in the last half of 1933. The average for 1933 was $0.44.



POST OFFICE REVENUE. The air mail appropriation is not a subsidy. A substantial portion of it comes back to the Post Office in revenue from postage. In spite of a general decrease in all postal revenue, the Post Office Department's estimate of income received from domestic air mail for the fiscal year of 1933 ($6,116,441) was higher than that of 1932. Foreign mail income dropped slightly, but remains nearly three times as great as it was in 1930.

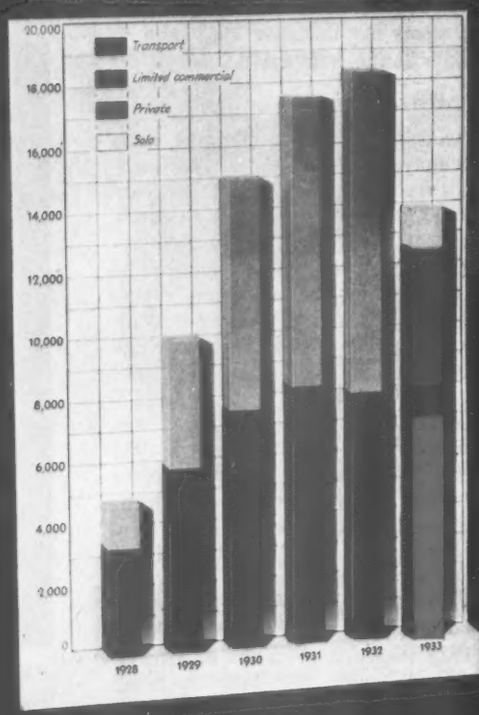


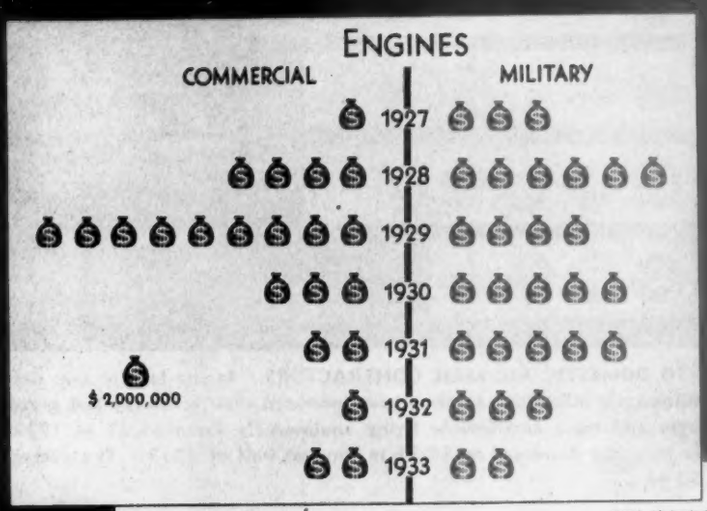
THE GOVERNMENT'S DOLLAR. Transport operators have increased their services to the Post Office Department in the face of decreasing compensation. Index numbers for service rendered per dollar spent by the Government on civil aviation show for 1933 an increase of approximately 40 per cent over 1932. Our Government has always received much more return for its aeronautical dollar than most foreign governments, but never before so much as in 1933.

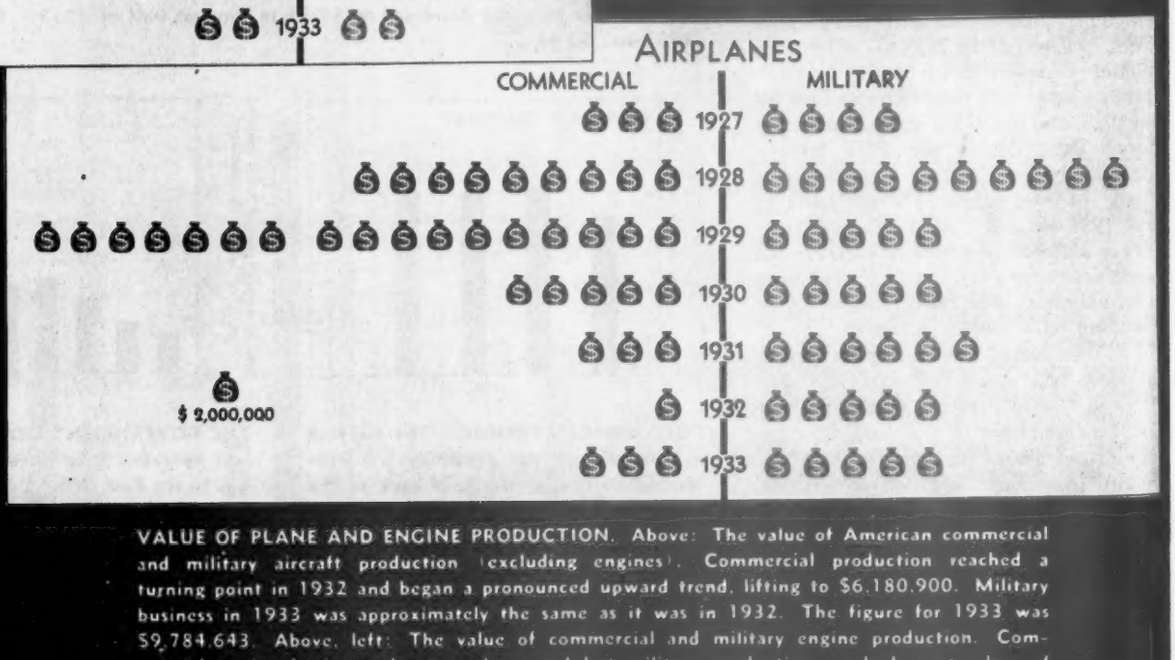


PLANES IN SERVICE (left). The number of airplanes in service in the United States at the end of 1933 has fallen off slightly, 6,896 planes were licensed, 2,388 identified at the end of 1933.

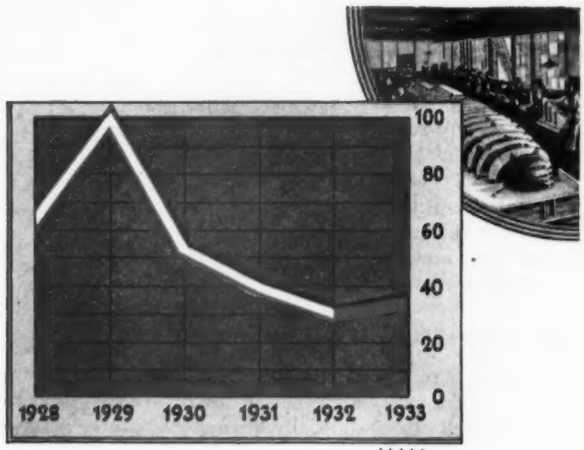
LICENSED PILOTS (below). The number of pilots holding licenses shows the effect of increased severity of the minimum requirements. The total at the end of 1933 was 13,960, of which 7,103 were transport tickets.







VALUE OF PLANE AND ENGINE PRODUCTION. Above: The value of American commercial and military aircraft production (excluding engines). Commercial production reached a turning point in 1932 and began a pronounced upward trend, lifting to $6,180,900. Military business in 1933 was approximately the same as it was in 1932. The figure for 1933 was $9,784,643. Above, left: The value of commercial and military engine production. Commercial engine business also turned upward but military production reached a new low of $4,986,181, 22 per cent below that of 1932.



Airplanes and Pilots

Concentration on development in anticipation of better markets

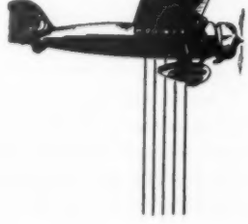
THOUGH THE PRODUCTION FIGURES on commercial airplanes in 1933 were nothing over which to start dancing in the streets, they have at least one remarkable characteristic. For the first time since 1929 they show an increase over the preceding year. A good many suggestions that the worst was over have been ventured in the last four years, in the pages of AVIATION and elsewhere, but this is the first occasion on which the record of a full year's experience has provided evidence to reinforce optimism.

There will be plenty to say about the nature of the commercial production and about the reasons for the increase over 1932, but it would be a sadly mistaken distribution of emphasis that would dwell on those matters without first remarking on the state of the military market. In only two of the last seven years has the production of military airplanes represented less than one-half the total dollar value of airplane production in American factories. The proportion of engine production that goes to military use is almost as large. In 1933 61.3 per cent of the total output of airplanes, again measured in dollar value and not in terms of number of units, went into Army or Navy service. Of the remaining 38 per cent, roughly 18 per cent was taken by transport companies, 10 per cent represented export to foreign governments, and the remaining 10 satisfied the present requirements of the private and industrial market. Private ownership should have a very substantial, perhaps a tremendous, future. The industry watches the development of private ownership with the keenest interest and with the fondest hopes, but taking the industry as a whole, military sales are still the backbone of its prosperity. Of course, however, any such classification is a little misleading, since some companies make an admirable living out of private business, with no thought at all of military markets, while others are virtually 100 per cent military or military with a slight admixture of transport, and have never been in the private market and have no intention of getting there for some time to come.

Military business

The fiscal maneuvers that attended the coming of the new administration just a year ago, and particularly the sharp limitations imposed on obligations to be incurred under the 1933 appropriation, resulted in the total purchases of military equipment falling to a lower level than in any year since 1927. That might seem to offer little reason for confidence that the worst is over, but in the case of military orders the turn has already come with the allotment of Public Works funds for supplying equipment to the Army and Navy. During the summer of 1933 production seemed to be falling to too low a level to admit of operating factories efficiently and of keeping up proper organizations for development work on new types, but the indication at present is not merely of a return to the condition of 1932 but for an amount of military production exceeding anything since the War. Naturally this turn of affairs has not grown out of any desire to promote the welfare of the airplane industry. The apparent decision to make a substantial increase in America's air forces, with the automatically consequent decision to buy great numbers of military airplanes, comes simply

For the first time in several years there is encouragement to be found in the field of aircraft manufacturing. Although military production dropped to a new low in 1933, the replacement of transport planes by all major operators had progressed sufficiently to turn the tide and the curve was headed upward at the end of the year. Production of civil and military aircraft, in number of units and in value, including airplanes manufactured for export, has been taken into consideration with varying weights in the preparation of the above index.



from what appear to be the inexorable necessities of the world's political situation.

Military operations and the use made of newly-acquired military airplanes, have been discussed elsewhere in this issue. Having made a duly respectful salute to the importance of the military factor in the aircraft market, we can now turn our attention back to the commercial side.

Planes in service

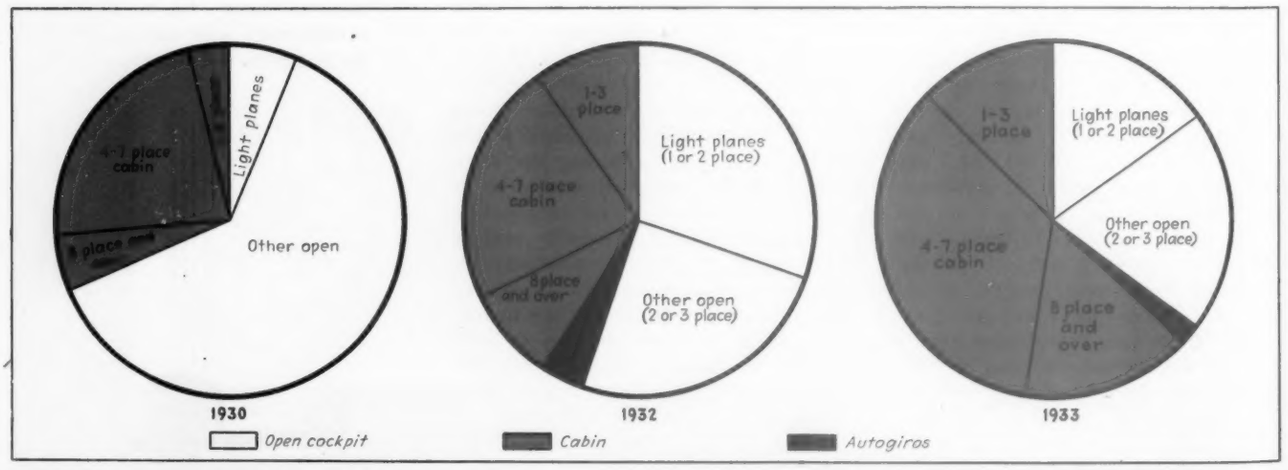
The number of aircraft approved by the Department of Commerce for active service fell off substantially during 1933, the number of replacements fail-

COMMERCIAL ENGINE PRODUCTION AND SALES

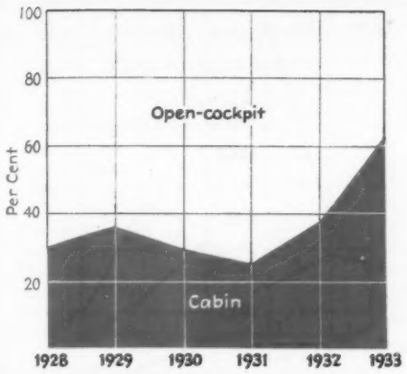
Horsepower	Units: Production 1932	Units: Production 1933	Units: Sales 1933	Value: Production 1932	Value: Production 1933	Value: Sales 1933	Average Unit Value: Production 1932	Average Unit Value: Production 1933
0–75	97	67	73	$56,410	$43,958	$46,638	$581	$656
76–125	58	102	99	66,910	124,230	119,640	1,150	1,217
126–175	32	30	44	59,970	56,695	83,395	1,870	1,890
176–225	84	152	183	183,160	364,135	433,070	2,180	2,400
226–300	123	95	104	321,120	255,705	286,405	2,600	2,690
301–400	42	36	28	182,290	145,330	112,130	4,310	4,040
401–500	119	67	64	570,700	325,788	307,788	4,790	4,850
501–600	228	232	249	1,281,700	1,224,500	1,337,700	5,630	5,280
601 and up	30	339	291	176,111	2,184,100	1,897,800	5,870	6,450
Total commercial	813	1,120	1,135	$2,898,371	$4,724,441	$4,624,566	$3,560	$4,220
Military	1,085	860	867	$6,370,678	$4,986,181	$5,024,281	$5,860	$5,800
Grand Total	1,898	1,980	2,002	$9,269,049	$9,710,622	$9,648,847	$4,870	$4,900

COMMERCIAL AIRCRAFT PRODUCTION AND DELIVERIES

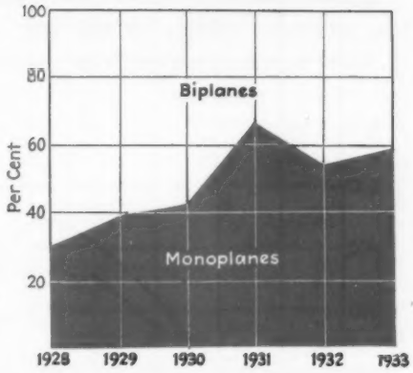
	Number of Planes: Production 1932	Number of Planes: Production 1933	Number of Planes: Sales 1933	Per Cent of Total Commercial: Production 1932	Per Cent of Total Commercial: Production 1933	Per Cent of Total Commercial: Sales 1933	Total Value: Production 1932	Total Value: Production 1933	Total Value: Sales 1933	Average Unit Value of Production: 1932	Average Unit Value of Production: 1933
Open cockpit monoplanes	126	74	69	23.0	12.5	11.4	$ 178,027	$ 111,125	$ 106,611	$ 1,410	$1,505
Cabin monoplanes	135	181	185	24.6	30.6	30.7	763,319	657,423	670,883	5,650	3,630
Multi-engine transports (monoplane)	8	69	71	1.5	11.7	11.7	178,152	3,181,787	3,211,193	22,270	46,100
Total monoplanes	269	324	325	49.1	54.8	53.8	$1,119,498	$3,950,335	$3,988,687	$ 4,150	$12,170
Open cockpit biplanes	175	133	144	31.9	22.5	23.8	628,214	508,906	528,228	3,580	3,820
Cabin biplanes	52	87	90	9.5	14.7	14.9	243,270	363,790	374,585	4,670	4,180
Multi-engine transports (biplane)	0	21	21	0	3.5	3.5	0	1,150,000	1,150,000	.....	54,800
Total biplanes	227	241	255	41.4	40.7	42.2	$871,484	$2,022,696	$2,052,813	$ 3,840	$8,400
Total open cockpit	301	207	213	54.9	35.0	35.3	807,241	620,031	634,839	2,680	2,990
Total cabin	187	268	275	34.0	45.3	45.5	1,006,589	1,021,213	1,045,468	5,380	3,820
Total multi-engine transports	8	90	92	1.5	15.4	15.2	178,152	4,331,787	4,361,193	22,270	48,130
Total land planes	496	565	580	90.4	95.7	96.0	$1,991,982	$5,973,031	$6,041,500	$ 4,010	$10,560
Amphibions and flying boats	14	15	14	2.5	2.5	2.3	116,407	144,069	141,069	8,300	9,600
Autogiros	39	11	10	7.1	1.8	1.7	230,510	63,800	52,850	5,910	5,800
Total commercial	549	591	604	100	100	100	$2,337,899	$6,180,900	$6,235,419	$ 4,260	$10,420
Military	593	466	468	...	...	...	$10,389,316	$9,784,643	$9,470,517	$17,520	$21,000
Grand Total	1,142	1,057	1,072	...	...	...	$12,727,215	$15,965,543	$15,705,936	$11,120	$15,100



DISTRIBUTION OF AIRPLANE PRODUCTION BY TYPES. The ascendancy of closed airplanes in the past four years is shown by the swelling red portions of the circles in the chart. In 1930 only 30 per cent of the planes produced were closed but the proportion reached 60 per cent of the total in 1933. Of these the majority were from 4 to 7-place, but the proportion of transport planes with eight or more places is constantly increasing and has now reached 16 per cent of the total. In the open plane segment the light planes were well on the way to supremacy in 1932, but showed some tendency to fall off during 1933.



OPEN OR CLOSED PLANES? Automobile experience is recalled in the struggle for supremacy of open and closed types. For many years the contention continued, until the closed types suddenly emerged victorious. Cabin planes represented 62 per cent of the total non-military production in 1933. Military design is following in the same direction.



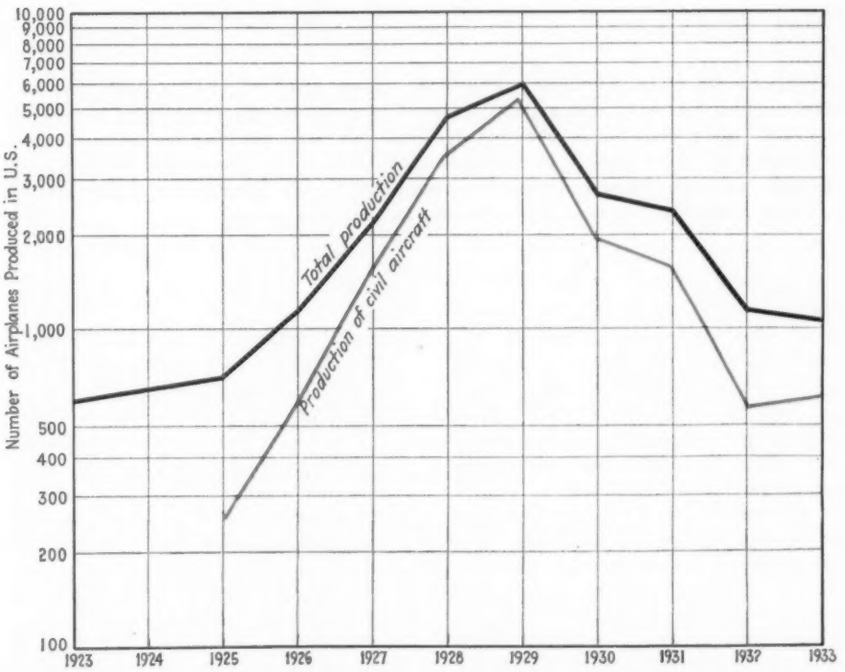
MONOPLANE OR BIPLANE? No such decisive trend can be discovered in the monoplane-biplane controversy, but the monoplane is gaining slowly, both for transport and private-ownership types. The sudden swing to monoplanes in 1931, with a subsequent reaction, was due to the short-lived light-airplane boom of that year.

ing to make up for the eliminations. At the end of the year the total stood at 9,284, almost exactly three-quarters being licensed and the remainder identified—a lower total than at any other time since the summer of 1929, but only about 13 per cent below the peak figure of the early part of 1932. It is impossible to say just how many of these machines are really in active use. The best estimates that we can make suggest that about 5,500 of the licensed planes and 800 of the identified ones are being flown with some regularity. The real current demand for airplanes in the United States seems to be around 6,000 machines. Of course there is every reason to think that the demand will increase with the improvement in general business, with improvement in the quality of the aircraft offered for sale or with reductions in their price, and simply with habituation of the American public to the idea of private flying. While no detailed census of licensed aircraft has been made since the one undertaken by the staff of AVIATION in the statistical issue of 1932, a study of the changes since that time leads us to believe that about 1,100 of the machines now licensed were built in 1928 or earlier, another 2,200 in 1929. In other words, almost half of all the licensed aircraft in the United States are now more than four years old. Many of them are fitted with engines of obsolete types, service upon which will become more and more difficult to secure. The normal life of a private airplane certainly ought not to be expected to exceed five years, or six at the very outside. The normal amount of replacement for the next two years would then be about 2,500 machines, excluding transport planes from the reckoning entirely. While replacement will not actually meet those figures, unless there is a fairly rapid business recovery, pressure for replacement will grow more and more acute with further postponement. It certainly appears that the average production of airplanes for private and industrial use over the next four years should be at least 1,000 per year, neglecting entirely any extension of the market beyond its present boundaries. And whatever shortage develops in the early part of that period will presumably have to be made up in the latter part.

Cabin planes gain favor

In 1933 the production, again excluding transport types and excluding also machines built by amateurs for their own use, was only about 600. The number was deplorably small, but the distribution of production sheds some interesting light on the changing nature of the private market and on the development of design thought.

Most striking of tendencies is the conquest of the field by the cabin plane. Even in military service, the open cockpit is giving way to an enclosure that increases the pilot's comfort, and so his efficiency, and that makes it unnecessary for him to dress up in the elaborate fashion that was an inescapable part of aviation only a few years ago. In the commercial field the open plane seems to be on its way to join the open automobile as a highly specialized type sold to a few sportsmen who like the feeling of the wind in their faces.



AMERICAN AIRPLANE PRODUCTION. From 1925 to 1929 the number of commercial and private planes produced each year grew rapidly. After the excesses of that period there was a sharp decline and military production assumed increasing importance. In 1933, however, the replacement programs of the transport operators turned the tide of commercial manufacturing, while the economy policies of the military services contributed to the downward trend of total production. Only 466 military planes were produced last year, while 591 commercial planes were built.

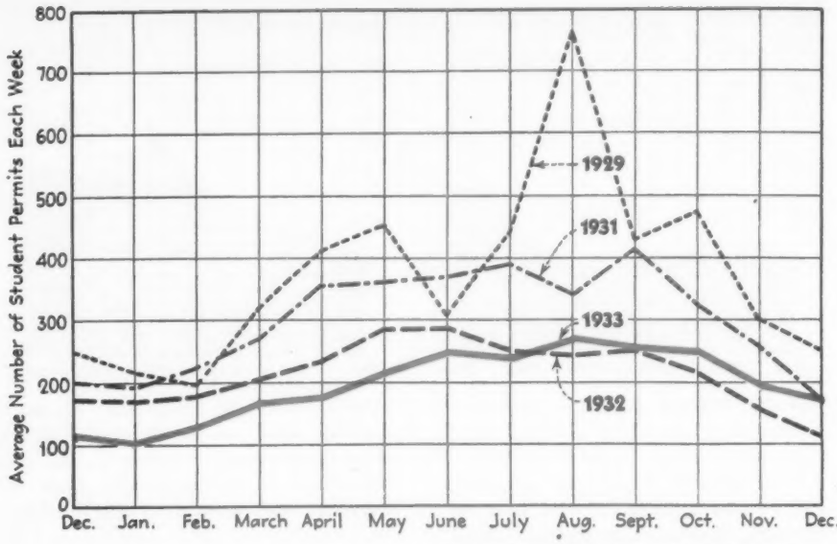
The light plane, selling at $1,800 or less, has continued to decline in relative importance. In 1931 machines of that class represented almost half of the total number of units produced. In 1933 they are down to about one-sixth, though of course their slice of pie on the circular chart on page 80 would be a more generous one if machines of amateur construction or assembled at home from standardized separate parts had been included.

Monoplanes for military flying

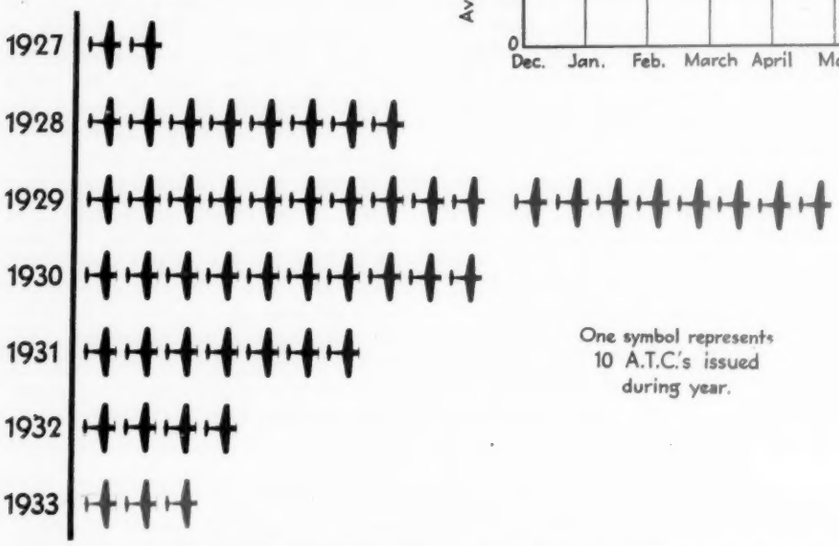
Neither the monoplane nor the biplane is gaining definite control in the commercial field. From 1929 to 1931 it looked as though the monoplane were certainly destined to triumph. It is still improving its position on the whole, but only slowly. Never yet has two-thirds of a year's commercial production been of the single-deck type. Among military manufacturers the monoplane's star is clearly in the ascendant. Though complete official figures are not available, it is known that up through 1929 the purchases of the Army Air Corps had never in any year included as many as 10 per cent of monoplanes. For the present fiscal year, on the other hand, the monoplanes will almost certainly be in a substantial majority. In that respect the Air Corps follows the general tendency of military procurement the world over, though the tendency has marched much more rapidly in France and very much more slowly in Great Britain than in the United States.

The production of airplanes remains surprisingly widely distributed. There were fifteen manufacturers that were individually responsible for as much as 1 per cent of the total production in 1933, and the ten leading firms combined accounted for only 66 per cent of the total. That shows slightly more concentration than in previous years, but only slightly.

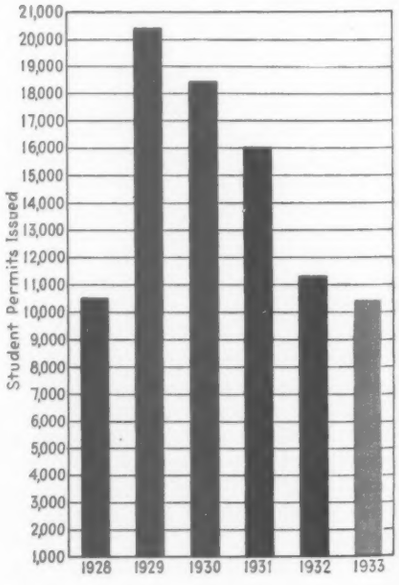
The number of new designs granted approved type certificates has continued to fall off, and is now perhaps a little below what should be considered normal, though there is no reason for any such preposterous number of alternative types as were appearing from 1928 to 1930. There are perhaps nine distinct categories of commercial airplanes that deserve recognition, and an average of three or four new designs



STUDENT PERMITS BY MONTHS. For the first time since 1929 there is indication of an upward trend in numbers of student permits issued each week. The curve for 1933 crossed that of 1932 during the past summer and has remained somewhat higher since, closing the year at the 1931 level. The figures for 1933 do not include the permits issued to former pilots whose licenses lapsed under the newly-increased requirements, and the various curves are therefore strictly comparable.



APPROVAL OF NEW AIRCRAFT DESIGNS. From 1928 to 1930 a preposterously large number of designs were granted approved type certificates, there being some 180 in 1929. Since then the number has declined each year, reaching the quite reasonable figure of 38 in 1932. In 1933, however, the A.T.C. production continued to diminish, and only 26 new designs were approved by the Department of Commerce, a number somewhat less than that called for by normal progress.



NEW STUDENT PERMITS. Since the enthusiasm of 1929 there has been a steady decline in the number of student permits issued by the Department of Commerce each year. Although in 1933 we are back to the level of 1928, the difference between the figures of 10,459 for 1933 and 11,259 for 1932 is less than one half the drop for any preceding year.

NEWLY LICENSED AND IDENTIFIED PLANES OF 1933

	Licensed	Identified	Total
Amphibions	4	....	4
Aeronca (open)	14	....	14
Aeronca (cabin)	40	....	40
Bellanca Pacemaker	3	1	4
Bellanca Skyrocket	....	3	3
Bellanca Special (Long Dist.)	1	....	1
Boeing 247	37	....	37
Curtiss Wright Condor	16	2	18
Curtiss Miscellanous	3	4	7
Fairchild 22 (open)	....	31	31
Fairchild 24 (cabin)	1	18	19
Fleet	9	....	9
*Heath	2	28	30
Kinner (open)	15	....	15
Kinner (cabin)	4	....	4
Lockheed Orion	6	4	10
Lockheed Vega	2	1	3
Monocoupe	10	2	12
*Pietenpol	....	20	20
Pitcairn Autogiro	....	9	9
Sikorsky	5	....	5
Stinson Junior	87	....	87
Stinson Transports	11	1	12
Taylor	2	17	19
Waco (open)	10	1	11
Waco (cabin)	79	....	79
Miscellaneous	47	128	175
Total	408	270	678

*Including amateur-assembled modifications.

ENGINES IN NEWLY LICENSED AND IDENTIFIED PLANES OF 1933

	Licensed	Identified	Total
Aeronca	54	2	56
American Cirrus	1	13	14
Continental 37-50	4	16	20
Continental 165	1	2	3
Continental 210	83	....	83
Ford	1	45	46
Heath	....	8	8
Heath-Henderson	....	11	11
Henderson	....	23	23
Jacobs	9	1	10
Kinner	39	16	55
Lambert	5	4	9
LeBlond	....	7	7
Lycoming	96	1	97
OX 5 and OXX 6	3	7	10
P. & W. Wasp	47	9	56
P. & W. Wasp, Jr.	6	....	6
Warner	7	30	37
Wright Challenger	....	1	1
Wright Gypsy	....	11	11
Wright Cyclone	26	4	30
Wright 175	3	3	6
Wright 200-220	3	....	3
Wright 330	4	....	4
Wright 420	1	4	5
Velie	....	9	9
Miscellaneous	15	43	58
Total	408	270	678

AIRPLANES NOW OWNED BY TRANSPORT COMPANIES

Boeing		115
247 (new bi-motor)	54	
80 and 80A (tri-motor biplane)	11	
40B and 40B4 (2 and 4 passengers)	33	
Miscellaneous	17	
Ford		65*
Stinson		57
Curtiss		33
New Condor	16	
Old Condor	5	
Kingbird and Falcon	12	
Lockheed		30
Vega	18	
Orion	12	
Stearman		25
Sikorsky		24*
38 (twin Wasps)	19	
41 (twin Hornets)	2	
40 (Clipper, 4 engines)	3	
Pitcairn		20
Fokker		19
Pilgrim		16
Consolidated		15*
Commodore (Flying Boat)	8	
Fleetster	7	
Miscellaneous		59
Total		478*

*Plus several planes being used under foreign registry.

each year in each category is not too many if each manufacturer is to refresh his line and modernize his models often enough to be sure to take full advantage of progress in the engineering art and of operating experience. There ought then to be about 32 new approved type certificates in a typical year, and whereas the industry held the A.T.C. production to slightly above that figure in 1932, it dropped in 1933 to 26, coming from but thirteen firms. Engineering departments will want to be active on at least a slightly broader front in the coming year, or some of the manufacturers will be in danger of getting out of step with the times.

Pilots and students

The personnel situation shows improvement on the whole, though the number of licensed pilots on the lists of the Department of Commerce has dropped to the lowest figure since the summer of 1930. That last statement, taken baldly, is somewhat misleading, for the drop has been due almost entirely to the change in requirements for a private license and to the introduction of a "solo" grade (more recently modified to "amateur"). Some thousands of pilots lost their licenses and reverted to student status on the strength of the change in rules, so that although there were only 13,960 pilots on the rolls at the end of 1933 their average of skill and experience was surely higher than that of the licensed group as a whole in any previous time. The number of holders of transport licenses remains approximately as for two years past, showing further very small gains, and the number of holders of the scheduled air transport rating, qualified to fly passengers over regular routes, has slowly been pushed up to 615. That grade is limited almost exclusively to the actual present employees of the air transport operators.

More important from the point of view of the future of the industry is the number of new men coming in from the bottom, and the number of new student permits issued almost held its own. The figure for new permits issued, incidentally, excludes entirely the cases of those who reverted from pilot to student status, so the records for the several years are strictly comparable. During the autumn the 1933 student-permit record climbed well above that of 1932, and the improvement continued through January of 1934, the total permits issued in that month running 34 per cent ahead of the total in the same month of 1933. Obviously, American youth are determined to put themselves in a position to get into the air as soon as the opportunity offers, even though financial obstacles may for the moment prevent their attainment of all their desires.

ACKNOWLEDGMENT

IN THE PREPARATION of this pictorial presentation of the progress of aeronautics it has been necessary to seek the co-operation of many organizations and individuals at a time when pressure of more immediate duties undoubtedly made it difficult for them to comply. Without exception our requests were granted, and in many cases special efforts were made to get material into our hands in time to be included in the issue.

As usual we are most deeply indebted to the personnel of the Aeronautics Branch of the Department of Commerce, upon whom we have depended heavily. We also wish to express particular gratitude to the staff of the Aeronautical Chamber of Commerce; to the Post Office Department; to the Departments of War and of the Navy; to the National Advisory Committee for Aeronautics; to the officials of a number of foreign governments; and to many individuals who have supplied us with information relating to their own activities or assisted in the compilation of material from official sources in the United States and abroad.

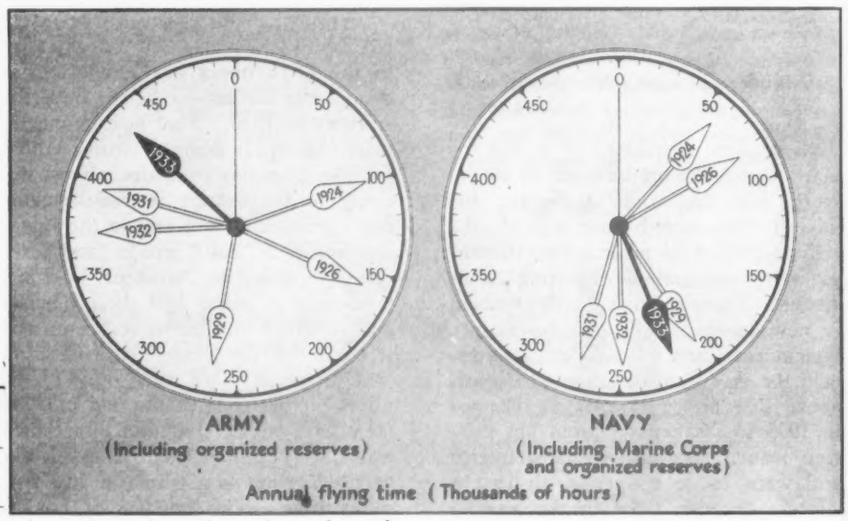
Army and Navy Operations

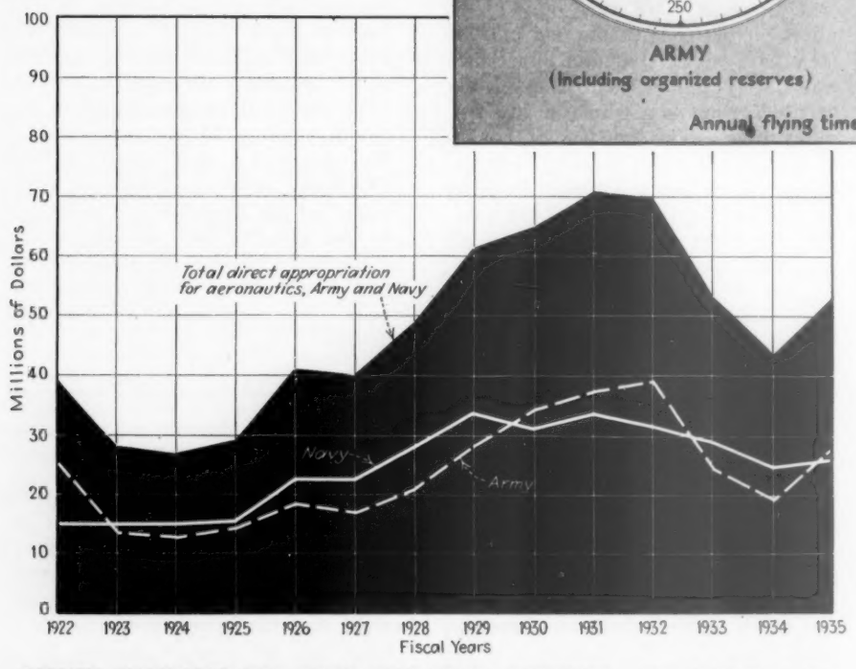
Five-year program levels are not yet reached

THE OUTLOOK for military and naval aviation has undergone at least two sudden changes within the past year. During the early part of the spring purchases of new equipment were virtually terminated by the incoming administration, and at one time it was impossible to gain any assurances regarding the future. Relief and the promise of a maintenance at least of present equipment levels came with the announcement of substantial grants of public works funds for new aircraft, and as the final result of all the shifts and adjustments considerably more money is being spent for aircraft and engines during the present fiscal year than in the preceding one. In the fiscal year 1933, in fact, total expenditures for new equipment dropped to a lower level than in any other year since 1925. For 1935 the promise is for a continuation approximately on the 1934 level, about $26,000,000 per year—still about 15 per cent below the figures that prevailed between 1929 and 1931.

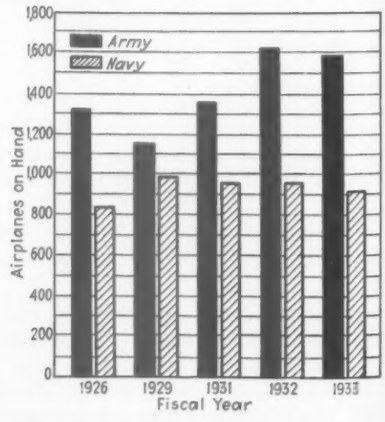
The result of the reduction from the 1929-31 level has been that new planes were acquired just rapidly enough to provide necessary replacements, and with no provision for expanding to fill the gap that still existed between the amount of equipment on hand and the amount that the five-year programs for 1926 had projected. In the case of the Navy the gap has been small, though even the Navy, at the last official accounting, was down to 919 airplanes on hand against an authorized 1,000. The Army has never yet been within 10 per cent of its appointed goal of 1,800 machines, and today actually possesses less than 1,600 serv-

ARMY GAINS, NAVY LOSES. In spite of reduced appropriations all along the line, Army pilots exceeded by 9 per cent the number of hours spent in the air over their best previous record set in 1931. They gained some 60,000 hours over 1932. At the same time, the Navy cut back still further, dropping below the levels set in 1931 and 1932.

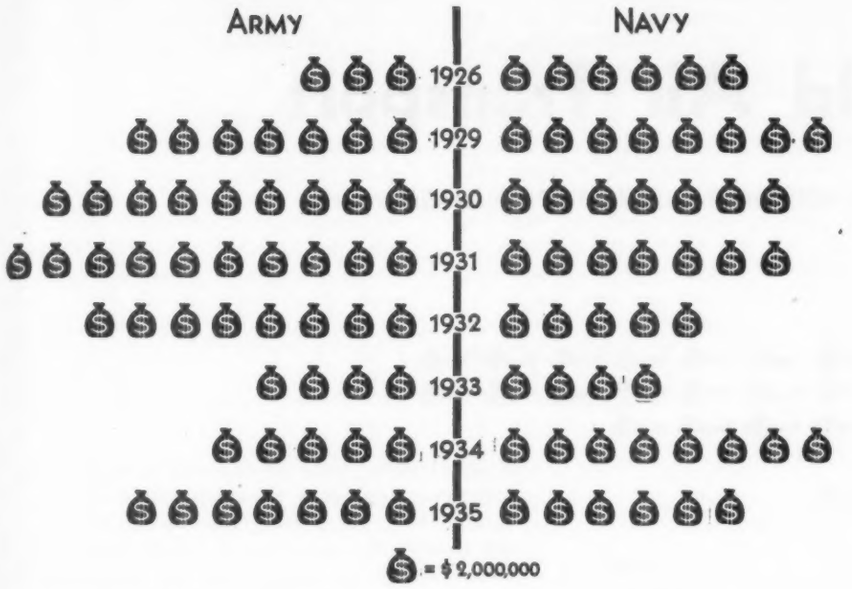




MONEY AVAILABLE FOR ARMY AND NAVY AVIATION. The total funds for military and naval aeronautical operations for 1934-35 were saved from tobogganing below 1926-27 levels by grants of PWA money for the construction of new planes.



INVENTORY. The number of planes available to the Air Corps and the Navy shows a tendency to decline, a trend which should be reversed during the current year when the effect of PWA money begins to be felt.



FOR NEW EQUIPMENT. Thanks to regular and emergency appropriations the money available for the purchase of new airplanes and engines pulls away from the low of $15,980,000, established in the fiscal year 1933. For 1935 the combined figure for the Army and Navy promises to come to $25,600,000.

iceable planes according to the latest records (the complete review of the position of the Air Corps at the end of the last fiscal year not being available as yet).

Though machines that can be considered as strictly obsolete are not included in the list of service equipment, a very large proportion of the airplanes of both the services have been rendered obsolescent by the extremely rapid developments in airplane design over the last two or three years. It is probably quite conservative to say that the Army and Navy together have no more than 600 service aircraft of really good quality in the light of 1934 standards. That implies nothing wrong with the other planes as of the time when they were purchased, but we have been passing through a period of extraordinarily rapid technical development, and practically everything that was built before 1932 must now be accounted as distinctly second-line. To rebuild the services up to the levels established in 1926 and to modernize the equipment in satisfactory fashion would require the purchase of about 1,000 airplanes in each of the next three years. The 1935 appropriation, at least, will not permit of purchase on any such scale as that. Obviously additional appropriations are to be needed in any case, however, to make good the plain intention of Congress to expand the total size of the aeronautical establishments to provide for new conditions. In particular, an authorization is at last being secured to increase the total number of naval aircraft to allow of planes on the new aircraft carrier Ranger and the other vessels recently added to the fleet. Taking account of these prospective extensions, clearly necessary if our naval and military forces are to be kept efficient and to be maintained in that relationship to the armies and navies of the rest of the world which has been established as more or less normal, the requirement seems to be for a total purchase of about 1,600 machines over each of the next three years instead of 1,000.

More flying time needed

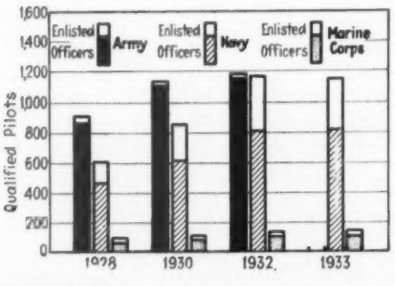
Naturally expansion of equipment calls for expansion of operations, of maintenance facilities, and the like. In 1932, for the first time since just after the War, the amount of flying done by the Army and Navy slipped back below the level of the previous year. In 1933 the Navy is again off by about one-sixth from the year before, but the Air Corps regained the ground that had been lost in 1932 and more besides, to a total of 432,966 hours. The two services are now flying approximately 650,000 hours per year. With the expanded activities now clearly in prospect, that total should certainly increase to not less than one million hours. Broadly speaking, to give pilots the amount of training they should have to keep fit, every plane in the military service should be flown at least 200 hours a year, and 300 is a much safer average.

Despite the obviously increasing relative importance of air power in military operations, the direct and indirect expenditures for military and naval aviation all combined only make up about 16 per cent of the total of the expenditure on national defense. Over the past three or four years that figure has shown no tendency to increase, but it can hardly escape doing so if the new programs being formulated by the appropriate committees in Congress are to be made realities.

European powers build up

The American decision to undertake an expansion program for our air forces comes as a sequel to a general interest in expansion programs on the part of European and Asiatic countries. The British Air Minister has recently indicated that the secondary position which he feels his country to have occupied in the air is no longer to be considered as tolerable, and that a building campaign designed to bring the British air force to parity with that of France must be undertaken. Various Continental countries are planning enlargements of forces or modernization programs, and it is probably fair to say that public opinion over the whole area of Europe is more preoccupied with military aviation than ever before.

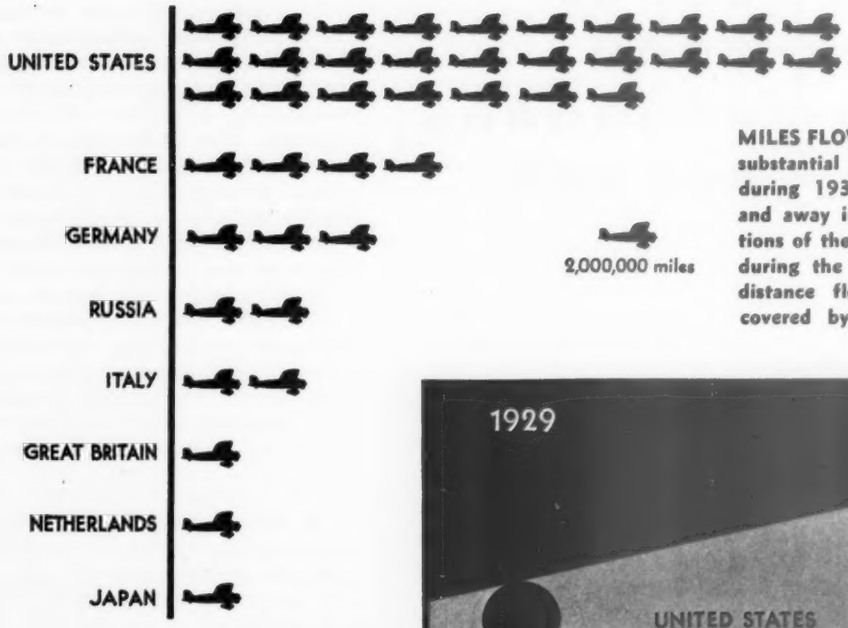
The records of safety for the Army and the Navy over recent years are pictured in the chart on page 76. The really spectacular progress that has been made in the past six years speaks for itself. At one time it seemed necessary to allow, in calculating the rate of replacement of naval aircraft, for an annual loss of 15 per cent by crash. Today the allowed fraction has been reduced to only 8 per cent. It used to be considered that there was a differential death hazard applying to aviation personnel, as against the rest of the service, of at least 3 per cent per year. The death rate among regular flying personnel has now been reduced to well under 2 per cent, and improvement still continues.



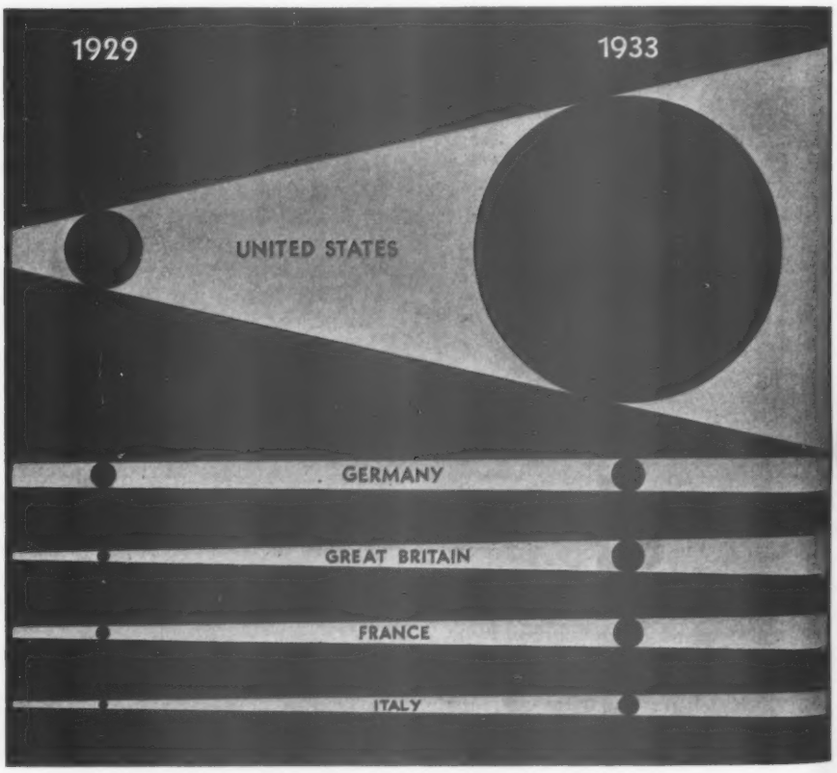
PERSONNEL. The Army and the Navy approach parity as to the total number of trained pilots on their rolls. The Navy, however, shows a much higher percentage of enlisted men.

World Air Transport

America's steadily lengthening lead in commercial aviation



MILES FLOWN. Although all countries record substantial increases in transport-miles flown during 1933, the United States is still far and away in the lead, and the relative positions of the other countries have not changed during the past year. Close to half of the distance flown on the world's airways is covered by ships under American registry.



AIRMINDED EUROPE? Air travel abroad seems to have approached a saturation point, whereas our patronage of the airlines is still accelerating. The diameters of the circles above are proportional to the passenger-miles flown during the years indicated.

EUROPEAN GOVERNMENTS woke up to the importance of developing a really first-class air transport service sooner than we did here, but when American air transport finally got under way it progressed at a rate that soon outdistanced the rest of the world. In the last four years, for example, the passenger traffic on Europe's airlines has practically doubled while that of America has quadrupled. Night flying had been a regular affair in the United States for several years before there was any serious attempt to maintain night schedules anywhere in Europe, and passenger flying at night is still unknown in the Eastern hemisphere except on one or two routes. European operators have some splendid achievements to their credit, especially on the long-distance "imperial" lines, but for every European achievement there is at least one American record to be set alongside of it.

What the charts do not show

So far as volume of operation is concerned, the charts on these pages tell the story. Some of the factors the charts do not show are that the average speed maintained on our transport lines is about 40 per cent higher than the average European speed—that the average American transport airplane flies more than 60 per cent farther in a year than the average plane of any European national system—and that in America air transport has been developed and maintained on an essentially competitive basis, with two or more distinct systems offering service between major points wherever that can be arranged, whereas in every European country of importance transport

operation has now been made a private monopoly or near-monopoly with a liberal government subsidy.

More for our money

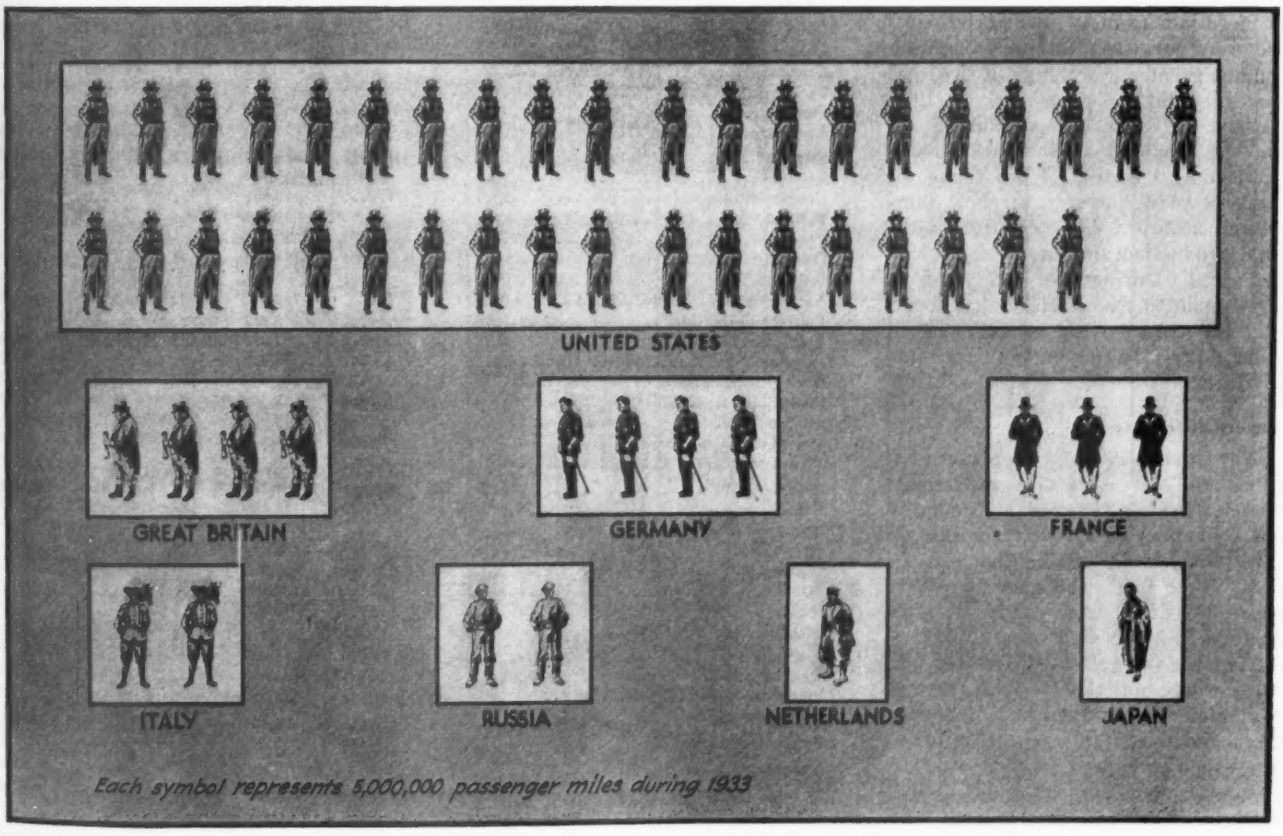
We have made no attempt this year to print the economic comparisons that have featured the past Record-of-Progress issues of AVIATION, as the devaluation of the American dollar has made it impossible to determine a fair basis of comparing American expenditures over the past year with those made in the currency of other nations. In general terms, however, any reasonable method of comparison that might be used leads once more to conclusions as favorable to the American operations as in the past. Last year we said, and proved it with figures, "that the American taxpayer gets more return in actual transport service rendered for every dollar put in aviation by the government than does his fellow taxpayer anywhere in Europe, and more than twice as much as in any other country except in Great Britain." In general terms, and with possible reservation with respect to The Netherlands where operations have been exceptionally economical, that is still true as written last spring.

Rather curiously, since it was in the United States that carrying the mail was first taken as the primary business of an airline, our lead over the rest of the world on mail and cargo is much less pronounced than on passenger traffic, but that is because European transport companies have had a special advantage in developing air express traffic in that they could immensely facilitate the clearance of parcels at international boundaries and that the competitive express service rendered by rail and ship was almost incredibly slow and exceedingly subject to breakage and pilferage of goods. In our domestic traffic, aviation has no such unique advantage, and the growth accordingly has been much slower, but even so the present total of mail and express traffic on American lines is approximately 3,350,000 ton-miles, while the leading country in Europe is Germany with 900,000 ton-miles, and the total for all the European nations is approximately 3,700,000. Apart from the record made in the United States, the western side of the Atlantic has provided some very interesting and important experience with "air freight" in Canada, where the terrible slowness of transport to remote mining camps and trading posts has made the airplane the standard vehicle of heavy transport, and has built up a freight traffic of approximately 750,000 ton-miles a year.

America leads in private flying

Though private aviation is in some respects less vigorous in the United States than in Great Britain, partly because of the compactness of the British Isles and the consequent ease and frequency of communication among private pilots all over the United Kingdom, in sheer numbers of planes privately owned and also in numbers of pilots, America stands first. Our per capita ownership of civil airplanes, excluding transport machines entirely, is more than twice that of any European state. As for pilots, approximately one out of 1,300 American males between the ages of 16 and 60 hold a currently valid pilots' license or student permit. Not even in such countries as Russia and Germany, where there has been a most enormous and elaborate government propaganda for mass participation in aviation, has any such ratio been attained—unless there has been a truly enormous expansion in Germany during the year since the last official figures on licensing of pilots and planes became available.

PASSENGER TRAFFIC. **In terms of passenger-miles, the United States bears an even stronger relationship to the rest of the world than in miles flown. A study of the relative standing of the several countries in the two charts indicates that Great Britain makes the most intensive use of its equipment.**



Foreign Trade

Back to 1929 levels

ONE OF THE BRIGHTEST SPOTS in the current aeronautical picture is the fact that the value of exports of airplanes, engines and allied equipment from the United States has climbed back to the heights attained during the peak year of 1929. Three principal factors are responsible. First, wars and rumors of wars, have boosted the demand for aeronautical products in certain quarters of the globe, as we will show presently from a study of the distribution of aeronautical exports. Secondly, advances in engineering and manufacturing technique have forced upon the outside world a recognition of the excellence of American-built products, and in the third place, devaluation of the dollar abroad has made available to foreign purchasers American products at very attractive prices.

The fact that the total sales for 1933 are equivalent to those of 1929 is not, however, the most significant feature. Export sales have become tremendously more important to American manufacturers because they now constitute a much greater percentage of the total than they did five years ago. In 1929 exports of airplanes accounted for only 12.5 per cent of the total domestic production, engines 5.4 per cent. In the past year, however, airplane sales abroad absorbed 33.8 per cent of the total production and engine sales 15.0 per cent. During the lean years at home, many a manufacturer has found that his salvation lay in the development of foreign outlets for his products.

Export distribution

The part played by airplanes, engines and accessories in the export trade of the last six years, is shown in the accompanying bar chart. It is of interest to note in passing that the per cent of the total represented by these three items is almost exactly the same in 1933 as it was in 1929.

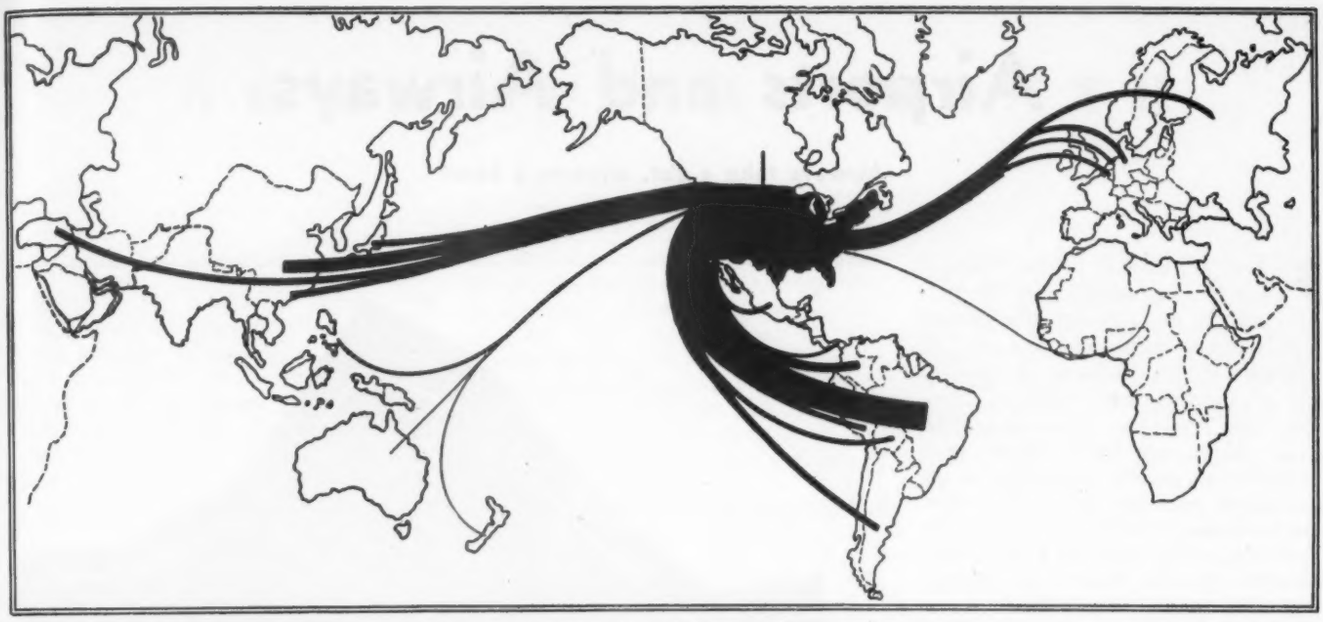
Exports are greatest in those countries where military activities are at a maximum. Europe as a whole must be excluded from this generalization as English, French and Italian producers naturally dominate the field. South America, Central America and Asia, however, are fertile fields for American exporters, and the outflow of aeronautical goods in those directions has been heavy during the last few years. A comparison of export sales for 1933 and 1932 (see table) shows significant increases in volume except for Europe in general and certain of the smaller countries.

The "flow-chart" which has been superimposed on the world map has been based upon average export figures for the years 1932-33. It reveals that our best customers still lie to the south

AERONAUTICAL EXPORTS

	1932			1933		
	Planes		Total	Planes		Total
	No.	Value	Value	No.	Value	Value
Canada and Newfoundland*	**19**	**80,583**	**178,141**	**2**	**10,301**	**64,188**
Mexico, Central America, West Indies*	**29**	**164,871**	**434,270**	**87**	**599,975**	**830,533**
Guatemala	1	4,600	9,902	2	12,500	21,164
Honduras	5	22,100	33,108	12	70,227	80,188
Nicaragua	...	.....	854	4	13,775	17,507
Panama	...	.....	41,748	9	146,363	229,872
Salvador	...	.....	1,647	4	59,641	67,764
Mexico	21	133,571	228,430	49	249,469	294,412
Trinidad and Tobago	...	.....	56,712	...	.....	33,528
Cuba	...	.....	38,105	...	.....	25,404
Dominican Republic	...	.....	7,632	1	16,000	22,345
Netherland West Indies	2	4,600	5,039	3	20,500	20,634
South America*	**153**	**3,319,468**	**4,124,449**	**167**	**2,565,763**	**3,785,836**
Argentina	8	64,960	266,837	38	417,962	677,437
Bolivia	13	254,001	271,071	7	133,000	260,813
Brazil	107	2,555,745	2,868,183	73	1,104,533	1,459,747
Chile	...	.....	14,883	2	50,000	59,284
Colombia	9	191,500	285,994	30	656,593	936,081
Ecuador	3	31,201	31,307	1	15,200	18,971
Paraguay	...	.....	.....	...	.....	12,511
Peru	9	176,816	321,910	16	188,475	353,741
Venezuela	3	41,000	56,073	...	.....	6,748
Europe*	**9**	**130,747**	**1,393,530**	**11**	**76,830**	**1,520,860**
Belgium	2	48,850	468,962	...	.....	37,508
Czechoslovakia	...	.....	16,458	...	.....	10,876
Finland	...	.....	2,218	...	.....	25,490
France	1	6,097	53,841	1	5,915	16,952
Germany	3	55,000	191,283	1	4,000	349,539
Italy	...	.....	3,696	...	.....	21,005
Netherlands	...	.....	158,012	2	12,042	319,803
Poland and Danzig	...	.....	2,227	...	.....	147,171
Portugal	...	.....	2,037	5	21,600	25,304
Rumania	...	.....	5,215	...	.....	24,726
Soviet Russia in Europe	...	.....	286,802	...	.....	380,222
Spain	2	10,800	18,572	1	4,204	7,396
Sweden	...	.....	113,954	...	.....	45,617
United Kingdom	1	10,000	56,559	1	29,069	84,913
Yugoslavia	...	.....	17	...	.....	15,171
Asia*	**51**	**739,584**	**1,318,582**	**126**	**1,992,438**	**2,764,533**
China	16	88,110	150,009	84	1,456,580	1,762,247
Netherland East Indies	...	.....	18,270	...	.....	51,113
Hong Kong	6	189,795	210,412	37	476,508	486,115
Japan	1	20,400	350,352	5	59,350	337,208
Siam	...	.....	2,135	...	.....	109,573
Turkey	26	432,459	577,406	...	.....	11,498
Oceania*	**8**	**87,496**	**240,919**	**7**	**80,486**	**145,006**
Australia	1	20,000	24,107	...	.....	43,624
New Zealand	5	5,839	6,032	1	5,883	6,926
Philippine Islands	2	61,657	208,115	6	74,603	94,307
Africa*	**4**	**16,970**	**20,358**	**5**	**35,700**	**39,203**
Union of South Africa	3	14,470	15,092	3	30,300	31,357
Greenland	...	.....	.....	1	**30,000**	**30,000**
Total	**273**	**4,539,719**	**7,710,259**	**406**	**5,391,493**	**9,180,159**

*Total includes exports to miscellaneous countries not included in the breakdown.



HOW AMERICAN AERONAUTICAL PRODUCTS FLOW INTO FOREIGN MARKETS. The lines on the map are weighted to indicate the relative dollar valuation of our exports for the years 1932-33. The distribution in per cent of total is as follows: Canada, 1.4; Mexico, Central America and West Indies, 7.5 (Panama, 1.6; Mexico, 3.1); South America, 46.9 (Argentina, 5.6; Bolivia, 3.1; Brazil, 25.7; Colombia, 7.2; Peru, 4.0); Europe, 17.3 (Belgium, 3.0; Germany, 3.2; Netherlands, 2.8; Russian, 4.0); Asia, 24.1 (China, 11.3; Hong Kong, 4.1; Japan, 4.1; Turkey, 3.5); Oceania, 2.4 (Australia, 0.3; Philippine Islands, 2.0); Africa, 0.4.

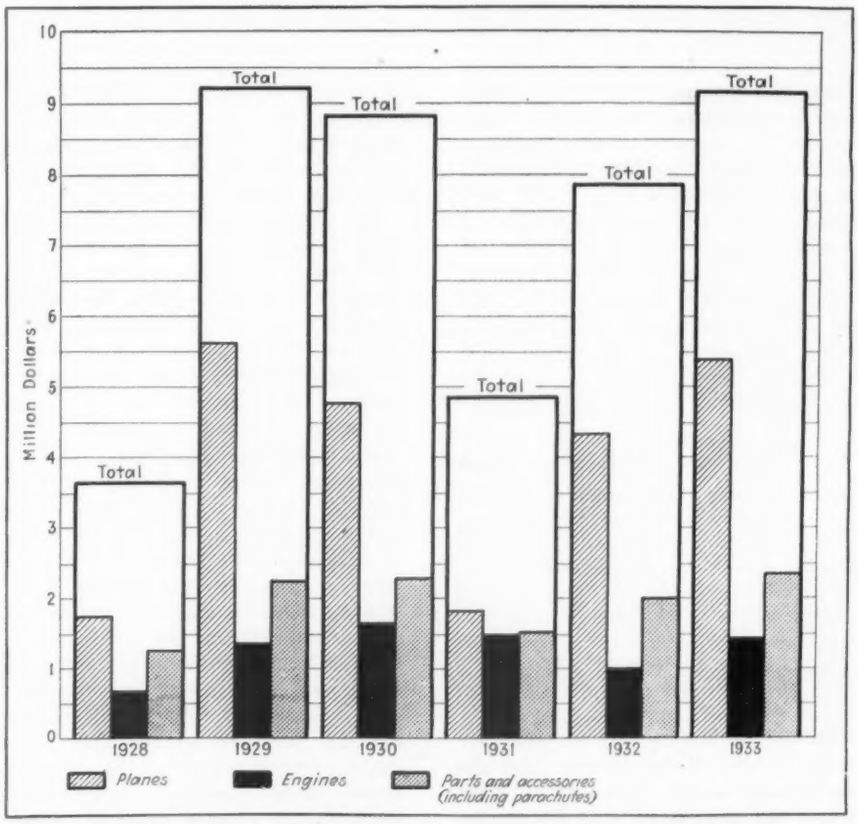
of us. Central and South America together took well over 50 per cent of the total outgo, Mexico, Central America and the West Indies accounting for 7.5 per cent, and all of South America together for 46.9 per cent. Outstanding among the customers in the latter group is Brazil which alone absorbed over one-quarter of the entire export. As a matter of fact Brazil leads the world as a market for American aeronautical products. In the last two years it has taken 180 American-built airplanes and has spent altogether some 4.3 millions of dollars for U. S. planes, engines and equipment. It is, however, one of the few countries whose purchases during 1933 were less than they were in 1932.

Asia as a whole is our next best customer with a total absorption of slightly under that for Brazil, alone. China (including Hong Kong) leads the Asiatic countries in purchasing with 15.4 per cent of our output. She ranks second to Brazil as a market. China's purchases, however, jumped from a total value of $360,000 in 1932, to somewhat over 2.2 million in 1933.

European markets

In Europe, Russia leads the field with 4.0 per cent. Her total purchases have increased from some $286,000 in 1932 to $380,000 in 1933. Belgium, Germany and the Netherlands are the other outstanding purchasers—averaging about 3.0 per cent each.

Canada, as a customer, has been steadily back-sliding. For the four-year period ending with 1932, she took, on the average, approximately 12 per cent of our foreign output. For 1932-33 together, the figure has dropped to 1.4 per cent and for 1933 alone to 0.6 per cent. Increasing pressure to "Buy British" and the establishment of certain Canadian branches by American manufacturers have undoubtedly contributed to this decline.



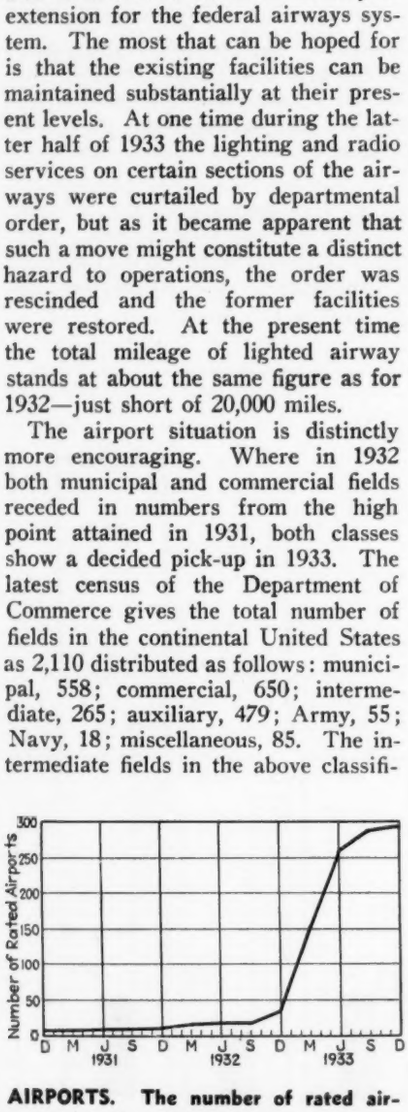
THE EBB AND FLOW OF EXPORT. Looking over the past six years. After the slump of 1930-31, our aeronautical exports practically regained their previous peaks.

Airports and Airways

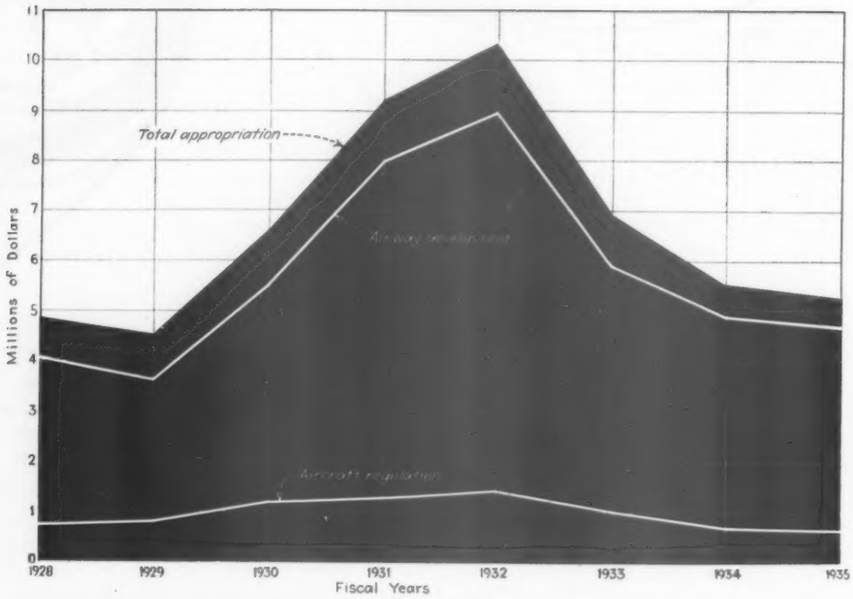
Airways take a cut, airports a boost

FUNDS AVAILABLE to the Department of Commerce under the regular budget for airways development and aircraft regulation continue to decline. By an extensive reorganization of functions and personnel, however (see AVIATION, November, 1933, page 354), economies have been achieved to permit regulation to be carried on with little loss of efficiency. As for airways development, it is palpably impossible with the funds available to undertake much in the way of extension for the federal airways system. The most that can be hoped for is that the existing facilities can be maintained substantially at their present levels. At one time during the latter half of 1933 the lighting and radio services on certain sections of the airways were curtailed by departmental order, but as it became apparent that such a move might constitute a distinct hazard to operations, the order was rescinded and the former facilities were restored. At the present time the total mileage of lighted airway stands at about the same figure as for 1932—just short of 20,000 miles.

The airport situation is distinctly more encouraging. Where in 1932 both municipal and commercial fields receded in numbers from the high point attained in 1931, both classes show a decided pick-up in 1933. The latest census of the Department of Commerce gives the total number of fields in the continental United States as 2,110 distributed as follows: municipal, 558; commercial, 650; intermediate, 265; auxiliary, 479; Army, 55; Navy, 18; miscellaneous, 85. The intermediate fields in the above classification are the only ones to show a decrease over the 1932 figures. This is not unexpected, however, for intermediate fields are frequently improved and move up into the commercial or municipal classes.



AIRPORTS. The number of rated airports in the United States increased rapidly during the first half of 1933 under the impetus of new Department of Commerce policy, but tapered off as funds ran low toward the year's end.



EXPENDITURES FOR AIRWAYS AND REGULATION. Money available for Department of Commerce aeronautics work has levelled off at about 1928 figures. The 1935 figure represents budget estimates.

Of interest is the accompanying curve of rated airports. For two years the number of rated fields coasted along at a nominal figure, increasing between Jan. 1, 1931, and the same date in 1933 from 6 to 36. In the first six months of 1933, however, the number sky-rocketed to 262, and wound up the year with 294. This phenomenal increase came about through a change in rating policy on the part of the Department of Commerce. It was formerly the practice to send inspectors into the field to rate airports only upon application of the owners. During the first part of last year, however, the department instituted a country-wide inspection program, and sent groups of inspectors into designated territories to encourage the rating of landing fields. At the same time certain of the requirements were modified somewhat in view of the general economic situation. The response to this program is apparent from the curve. During the latter half of the year, funds available for the work dwindled and the number of ratings tapered off rapidly. At the moment, no money has been appropriated for the purpose, and the work is at a complete standstill.

About the first of December, the Department of Commerce announced a new airport program which should boost the reasonably constant figure for auxiliary airports during the current year. Some $10,000,000 of Civil Works Administration money was earmarked for the construction of 2,000 auxiliary landing fields. The obvious intent was to put a large number of men to work immediately, but the secondary result (assuming that the program is carried through to its announced conclusion) will be a tremendous increase in intermediate landing fields and small airports. Within a month of the announcement, some 460 projects had been put under way in 41 states, of which approximately one-half involved improvements in existing airports and the other half the construction of totally new fields. The airports program is an important adjunct to the effort to encourage private flying through the development of a low-priced airplane for popular use.

NEWS OF THE MONTH

Air mail investigation

ABOUT the middle of January the Senatorial investigation of the air mail situation slipped into high gear and accelerated at an amazing rate. Chief Inquisitor Hugo Black was assured by witnesses that certain files from the Postmaster General's office had been burned just prior to the time that the new administration took over. Later, this issue was somewhat beclouded when ex-PMG Brown produced for the committee the papers that had supposedly been burned.

Closely allied to the Episode of the Missing Papers was the now famous McCracken-Brittin-Hanshue incident. When the committee subpoenaed the files of ex-Assistant Secretary of Commerce William MacCracken for examination, the latter, acting on the principle that one of the first duties of an attorney was to protect the privacy of the records of his clients, wired all concerned for permission to turn the papers over to the Senate. Two clients, Col. L. H. Brittin, executive vice-president of Northwest Airways, and Gilbert Givven, representing Harris M. Hanshue of Western Air Express, took occasion to visit the MacCracken office and removed certain papers which they claimed were of a purely personal nature. Col. Brittin destroyed his by tearing them up and putting them in an office waste basket (later to be found, pieced together, and produced against him by Department of Justice operatives), but the Western Air letters were later turned over to the committee. The Senate, charging that MacCracken was a lobbyist and could not claim the privileges of an attorney in this case, ordered his arrest for contempt, together with Brittin, Hanshue and Givven. The latter three submitted to arrest, but the former, protesting that he had acted in good faith within his legal rights, and questioning the right of the Senate to detain him, was brought to trial only after a Gilbert-and-Sullivan man-hunt through the wilds of Washington. MacCracken and Brittin were convicted and sentenced to ten days in the District of Columbia jail. Colonel Brittin has already served his term, but MacCracken has carried the fight to the Court of Appeals and has been released on bail pending the final decision.

Long before the curtain was rung down on this thriller, the blow fell which completely stunned the aeronautical world. Acting on the belief that the testimony taken before the Black Committee, together with investigations of his own, indicated that the air mail contracts had been obtained illegally, Postmaster General Farley ordered the annulment of all domestic route certificates effective midnight Feb. 19. The Army Air Corps was ordered to prepare itself to take over the carriage of the mails on that date.

When the dumbfounded industry had recovered its breath sufficiently to become articulate, a flood of protest poured into Washington. Not alone the operators, who saw hard-earned ground cut away from beneath their feet, but a large share of the public outside the industry set up indignant demands for specific charges against the legality of the contracts, and protested the right of every American citizen to a fair trial before condemnation. Among them, Col. Charles A. Lindbergh wired President Roosevelt a plea for a fair hearing for the airlines. A nationwide controversy was precipitated when the only reply vouchsafed the Colonel was a curt rebuke from a White House secretary charging publicity-seeking because the telegram had been published without official sanction. Public opinion on this incident, judging from telegrams and other messages received in Washington, was about equally divided between the administration and the Colonel. (Heretofore, a score of ten to one for the administration on any public question had been a fair average). To all pleas for reconsideration, however, the administration turned a deaf ear. It has been widely quoted that the Post Office Law of 1872 has been invoked, under whose terms a contractor whose license to carry U. S. mails has been once revoked is enjoined from bidding on any government business again for a period of five years, a move which might easily prove fatal to the existing airlines. At the moment, however, there is some indication that legislative steps may be taken to remove this ineligibility and to permit present organizations to bid on a revised schedule of payments based on a pound-mile formula (see page 92).

Five days after the abrogation of the contracts, Postmaster General Farley issued an open letter to Senator Black intended to justify the government's reasons for the confiscatory action without due process of law. It stated little that had not been brought out previously before the committee, reiterating at some length the charge that the present contracts had been drawn up in a secret session of Post Office and air line officials, and that they were the result of collusion and conspiracy rather than of open competitive bidding as was the intent of the McNary-Watres Act.

Finding that mere protest was of no avail, legal machinery was put in motion by Transcontinental and Western Air. A "show cause" order was obtained in the Federal Courts in New York, but three days later a motion for an injunction restraining Postmaster General Farley from putting the contract annulment into effect was denied by the same court, reason: non-jurisdiction based on the well-established legal rule that the government cannot be sued except by its own consent. In the meantime other operators refrained generally from any public announcement of plans, seemingly awaiting developments. Persuasion and legal force having thus failed, the carrying of domestic air mails by private contractors ceased on Feb. 19, as ordered (see page 92).

One repercussion came from Wall Street. To run down rumors that numerous short-sale orders for aviation securities had been handled through Washington brokers during the period preceding the actual cancellation, the New York Stock Exchange sent out questionnaires to all members requesting a list of all sales of principal aeronautical stocks between Jan. 26 and Feb. 9.

Appearing before the Senate committee to refute the charges leveled in the Farley letter, former Postmaster General Brown denied that the conference of operators in his office, on which Postmaster General Farley had based the annulment of the contracts, was clandestine or was called for the purpose of parcelling out routes to favored air lines.

Calendar

March—Dedication of Pan-American Airways System's International Marine Airport, Dinner Key, Fla.

April 27–May 6—International Show of Sport & Touring Aviation, Geneva, Switzerland.

May 27—Deutsch de la Meurthe Cup Race.

June 28–July 8—Annual meeting, Soaring Society of America, Elmira, New York.

October—MacRobertson International Air Race, London to Australia.

November—Viceroy's Challenge Trophy 700 mile race, India.

Mr. Brown stated that no contracts, extensions, or anything else were let by agreement arrived at in the meeting, which was held for the sole purpose of working out an understanding between passenger and mail operators running parallel lines as to the controversial question of pioneer rights in those territories. In reply to the charges of illegality in connection with Second Assistant Postmaster General Glover's extension of contracts for six months, to terminate in May, 1930, Mr. Brown quoted from the general statute applying to mail contracts, which provides that six months extensions may be granted on specific contracts up to the limitation of four years, if, in the opinion of Post Office officials, it is considered the best thing for the postal system. Mr. Brown emphasized that he had acted in accordance with his own idea of basic law and the provisions of the McNary-Watres Act, and that his policies met with the approval of President Hoover, who left specific details of Post Office management to his Postmaster General.

Martial mail

Bad weather conditions, lack of proper radio equipment, and unfamiliarity with fixed mail routes were a few of the problems confronting Army aviators when they took over air mail operations on Feb. 19. Hastily reorganizing after the edict of Feb. 9, the Army Air Corps prepared as best it could in ten days for the highly specialized job of carrying mail over seventeen routes selected by the Post Office Department as the most essential of the 26 of the airways system. Major General Benjamin D. Foulois, Chief of the Air Corps, immediately turned over to the Post Office service 148 planes, largely pursuits, with some bombardment, attack, and observation types and a few cargo planes, as well as 200 flying officers and an enlisted personnel of 324 mechanics and riggers. To convert these military craft into planes fit for mail service was another, more difficult matter. Mechanics worked day and night, tearing machine guns, seats, and everything else detachable from spare cockpits to make room for mail bags. Blind-flying instruments were installed, and an attempt was made to provide the planes with two-way radio sets, not feasible in some cases since many Army planes are not adapted for commercial types of radio equipment. Eager for the opportunity to pile up flying hours, and undaunted by the fact that they had not been trained in the type of flying now confronting them, Army pilots conned mail routes, practiced blind-flying, made test flights.

While planes were being adapted to mail service, and pilots initiated into its requirements, the air mail system was divided into three zones, designated Eastern, Central, and Western, and zone commanders were appointed, each with blanket authority to call upon any Air Corps personnel or equipment in his zone. The Eastern zone comprises routes between Boston and Miami, and as far west as Chicago. Though Newark airport was designated as its mail terminal, facilities for emergency administration quarters were found to be inadequate, and the executive headquarters were hurriedly transfered to Brooklyn at the Floyd Bennett Municipal Airport. The Western zone, taking in all territory west of Cheyenne, has headquarters at the municipal airport at Salt Lake City. Chicago's municipal airport was made the base of mid-western operations, forming the Central zone. Approximately 40,830 miles are traversed each day by army planes, making 68 trips. Of these, 36 are made in the Eastern zone, covering 20,164 miles; 20 in the Western zone (11,922 miles); and 12 in the Central zone (8,744 miles). Additional routes will be placed in operation as fast as personnel and equipment can be obtained and schedules worked out.

The gravity of the situation, intensified by winter storms, became immediately apparent. Before the first sack of mail had been carried, three young Reserve officers were killed while flying to their posts. The fatality total was raised to six during the first week of operations. One pilot crashed with mail in Ohio, while ferrying a ship in Texas, and a third was drowned when disaster overtook the amphibion which was carrying him from New York to Virginia. These casualties plus several serious accidents to personnel and planes, as well as mishaps of a less grim nature precipitated bitter attacks in Congress against the administration's method of dealing with the emergency. A resolution providing for immediate Congressional investigation of the Air Corps' planes, equipment, and training facilities, was filed in the House by Representative McLeod of Michigan. In spite of heated Republican opposition, however, the House passed the Brunner Emergency Air Mail Bill authorizing the Postmaster General to use the Air Corps to fly the mail for one year. The same bill provides for the transfer of the unexpended balance of the current air mail appropriation to the War Department to finance the Army mail service.

Army pilots and ground personnel will receive the usual $5 per diem "travel" allowance while on mail duty away from their stations. Even with this additional allowance, army fliers' pay is substantially less than salaries paid to commercial pilots. Nevertheless, some few applications were received by the Air Corps from pilots and co-pilots who had lost their jobs as a result of curtailment of private contractors' schedules, while hundreds of Air Reserve officers without air mail experience offered their services. The acceptance of such offers is conditional upon future determinations of policy.

Though most of the fourteen operators whose mail contracts were cancelled were forced to restrict passenger and express services to a greater or lesser degree, United Air Lines and American Airways announced that their schedules would continue as usual. Transcontinental and Western Air furloughed all employees, effective on Feb. 28, took back a skeleton force to fly one transcontinental round trip daily. Eastern Air Transport put into effect curtailed schedules, eliminated night-flying. United States Airways announced that it would suspend operations on Feb. 28 unless developments permitted it to continue as a mail carrier. Northwest Airways offered to sell out to the Great Northern and the Northern Pacific Railroads, but in the meantime announced the continuation of its schedules. Officials of the New York, New Haven & Hartford Railroad admitted that proposals had been submitted whereby a new airline between New York and Boston would be established or an existing line taken over by them.

Legislation after ukase

Immediately upon the abrogation of the mail contracts, the Post Office Department submitted to Congress a bill authorizing all details of the War Department's operation of mail routes (see above), and containing provisions for short-term mail contracts with private operators which underwent various mutations in the course of House and Senate discussion. The original clause authorizing the Postmaster General to make contracts for three months at not more than 40 cents per plane-mile was deleted and alternative proposals were considered. One amendment offered by J. C. O'Mahoney, regarded as Senate spokesman for the Post Office Department, would permit holders of cancelled contracts to bid again on routes to supplant the Army Air Corps service without waiting the five years required by existing law. Turning from denunciation to construction, Senator Black and Postmaster General Farley set to work to devise a new financial structure for air mail to replace the one summarily destroyed. One present plan proposes to restore air mail operation to private companies which would be regulated by the Interstate Commerce Commission. With the government keeping check on operators' books, the Post Office Department would pay out as a subsidy the exact net operating loss suffered by each company every month, regardless of the amount of mail handled. To permit an opportunity for profit, the legislation would provide that in no case would the gross payment be less than the net income to the government for the air mail carried by each line.

Before the mail investigation had

reached the point of contract cancellation a bill was introduced in the House by Thomas S. McMillan, designed to make air mail gradually self-supporting while preserving the government's investment in developing commercial aviation. Feature of the bill was the proposal to use a 3-cent air letter-gram and a special 2-cent postal, as well as a flat rate of 5 cents per ounce, instead of the present rate of 8 cents per ounce and 13 cents for every ounce thereafter. Lowering of rates would increase the volume of mail carried, hence the Post Office receipts, McMillan argued with logic, if not originality. Those who have followed the investigation-legislation circle of the brief but pungent history of air mail will observe that in essentials the McMillan bill re-echos the proposals of the so-called Kelly bill of 1933, (AVIATION, June, 1933, pp. 177-9) which was drafted by the mail investigation committee of that date after consideration of the House Post Office Committee's report, and the separate report of special investigator Dr. John B. Crane of Harvard University. The idea of the 3-cent letter-gram, which was among the proposals of the Kelly bill, was first promoted by A. H. Rushton of Omaha, who expounded the plan in a letter published in AVIATION in May, 1932, editorial approval of the idea being bestowed in the same issue. Mr. McMillan's plans for payment of operators include a flat rate of 25 cents per mile with additional payment of 1 mill per pound-mile flown, and a guarantee to the operator of 45 cents per mile for the first year. This rate and premium would be scaled down 5 cents each year, until they become stabilized at a flat rate of 25 cents a mile at the end of the fifth year. The Postmaster General would audit the books of contracting operators at least once each year, with a view to reducing government payments when large profits are shown. As compared with the McMillan bill, the Kelly bill of 1933 proposed that air mail carriage should be paid for at a normal base rate of 2 mills per pound-mile and that payment was never to exceed 50 cents a mile. To assist operators not yet self-sustaining an additional premium not to exceed 25 cents per mile would be paid at the discretion of the Postmaster General, this payment to terminate in 1939.

Chairman Mead of the House Post Office Committee also came forward with a bill after the contracts were cancelled which duplicated that advanced by McMillan except for a slight variant in the method of paying mail operators. Mead proposed a flat rate of 5 mills a pound per mile for the first 25 lb., 2½ mills for the second 25 lb., and 1 mill per pound for all remaining. He urged also the extension, at higher rates, of air mail service to Hawaii, Alaska and our possessions in the West Indies.

Some days later, after a plethora of proposals to determine future air mail policy had been offered in the House, Representative Mead gave his support to another bill, drafted by Representative Kelly, which provides for the same rate of payment as that which was proposed by him last year (see above). The measure further provides for route warrants for contractors whose contracts have been cancelled, giving them the right to carry mail at the prescribed rates for a period of ten years, subject to cancellation for violation of Post Office regulations. Any air line company flying over any route not covered by the "pioneer group" warrant holders would be enabled to carry mail at the discretion of the Postmaster General in the same manner that ordinary mails are now conveyed by railroads. There would be no contracts other than the warrants issued to the companies whose contracts are now abrogated, and these warrants would be issued solely to protect their investments as pioneer operators.

The most fundamental difference between the proposed legislation and the McNary-Watres bill, under which the lines have been operating, is that the Watres bill empowers the Post Office Department to contract for the use of space in a transport plane, whether or not it is filled, while the new laws provide for compensation for service actually rendered on a pound-mile basis.

Army-Navy Investigations

Ploughing through a welter of charge and counter-charge, and a mass of curiously conflicting testimony offered by experts and near-experts, the Military Affairs Committee and the Naval Committee of the House of Representatives in parallel investigations have been trying to determine winners and losers in the business of supplying the Army and the Navy with aircraft. During the opening days of the hearings a great deal of testimony was taken relative to profits made on military orders. What constitutes a fair return on such orders seems to be a moot question. So-called "profits" on *production* orders ranging from 0 to 90 per cent were widely quoted against certain manufacturers, but little weight seemed to be given to offsetting statements of losses incurred in producing experimental orders and in technical development for both services. To cries of "Plunder" and "Robbery" raised by such perennial critics as General William Mitchell and Inventor James V. Martin (a witness whose similarity of name to a well-known figure in the aeronautical world lent weight to his testimony in the lay mind), such long-time contractors to both Army and Navy as Maj. Reuben Fleet and Glenn L. Martin offered the evidence of cold statistics. The former related that, when in 1927-28 he was charged with making excessive profits on certain Army orders, he sold 50 airplanes worth

HIGH, WIDE AND HANDSOME

Dramatic proof of the high efficiency and technical advance of the air transport industry was presented at Newark airport when TWA's luxurious Douglas monoplane, powered with two 700 hp. Wright Cyclones finished a record breaking transcontinental hop. Averaging 203 m.p.h. elapsed time, the plane made an all time record for transports of thirteen hours, four minutes, twenty seconds, five hours less than the previous passenger plane record and only three hours more than the record for racing planes.

$6,000 apiece for $1 each. Subsequent orders taken at prices set by the Air Corps resulted in losses totaling a quarter of a million dollars.

For the Naval Committee, Glenn Martin produced evidence that from 1920 to 1933 the net profit on planes supplied to the government amounted to only 3.9 per cent. Experimental orders incurred losses ranging from 100 to 300 per cent. In the governmental system of accounting it appears that losses on experimental work often are not fully charged off against production orders, nor can interest on borrowed capital, advertising charges, sales commissions, etc., be included.

A study of the testimony so far offered leads to the obvious conclusion that the system of procurement here-to-fore employed by government agencies leaves much to be desired. Opponents of the open bidding system argue that the Services are thereby prevented from obtaining the best equipment to be had, for the specifications must be written around average performance figures so that it will be possible for more than one manufacturer to bid. For example, it was pointed out that whereas the specifications for 100 new airplanes to be bought with PWA's $7,500,000 (AVIATION, February, page 55) were originally written calling for 235 m.p.h. top speed, 500 in cruising radius, 27,-800 ft. ceiling they were later modified by the Air Corps to read 176 m.p.h. top, 400-mile range and 18,700-ft. ceiling so that more than one manufacturer could bid. A better plan, critics said, is the usage of negotiated purchases from firms whose products, due to excellence in design and advanced engineering, offer the greatest possible performance for the duty required. On this point Glenn Martin said, "Unless you permit the government to buy the types of plane it wants, you won't get the best."

Major Fleet proposed the adoption of a cost-plus system whereby the government would pay the cost of materials and labor, plus 100 per cent overhead to take care of factory and experimental requirements, plus a reasonable profit. Such a procedure, he stated, would reduce costs to the government, and be fair to all contractors.

That Naval purchasing policies have a direct bearing on profits was brought out by Admiral King. Since it is axiomatic that the government must avoid having "all its eggs in one basket" two or more sources of supply for essential equipment must be maintained. Prices and profits are thus a function of what must be paid to keep the contractor in the least favorable economic position in business.

In some comments on both investigations, there has seemed to be a tendency to consider that the making of anv net profit at all on government orders is *prima facie* evidence of something wrong. To have incurred losses is to become more safe from suspicion. Particularly suspect are companies paying high salaries to executives. The income tax returns of all individuals connected with firms supplying aircraft and allied materials to the Services have been ordered made accessible for examination.

Wings for war

Smoothly, the $286,445,577 Naval Appropriation bill for the fiscal year 1935 passed the House of Representatives, and went to the Senate which likewise approved it with slight changes, increasing the net total $115,440. The bill not only provides 2,800 more seamen and 1,000 additional marines to man the sixteen new ships which will be completed within the next year and a half, but also funds for beginning another 8-in. gun cruiser and three more 6-in. gun cruisers. Carry-overs and other funds left from previous authorizations including PWA's will bring the total available for expenditure in the next fiscal year to about $442,000,000. Six days later the Vinson Naval Replacement bill, calling for $475,000,000, passed the House of Representatives. The measure provides over a five-year period for 102 ships (65 destroyers, 30 submarines) to replace obsolescent vessels and one aircraft carrier to replace the over-age Langley. A sum of $90,000,000 for the purchase of 1,184 airplanes, bringing the Navy aircraft strength up to 2,184 planes was authorized in an amendment, after Admiral William H. Standley, Chief of Naval Operations, pointed out to the House Naval Affairs Committee that planes are as necessary to his new ships as guns and ammunition. Since President Roosevelt took office 54 ships have been started, 22 with regular naval appropriations, 32 with PWA funds. With the new appropriations the navy will be able to bring its tonnage up to the London Naval Treaty's limit by Dec. 31, 1936, insuring the greatest peace time strength ever attained by the United States.

Vital feature of the War Department's new five-year plan to modernize the country's air defenses is the General Headquarters Air Force, to be completely separated from other branches of the Army and responsive to direct orders of the commander-in-chief of armies in the field. Conclusions of the General Staff, after prolonged study of the military aviation situation brought out the cogent facts that the existing strength of the Air Corps is far below national defense requirements and that the percentages of types of aircraft should be revised. The proposed increase and reorganization of the Air Corps is a logical consequence. War Department officials point out, of the recent grouping of Army tactical units into four combat armies. While no definite totals of planes, nor of officers and men were officially announced, it was estimated that about 900 planes would be necessary to develop the GHQ Air Force, of which a small nucleus consisting of two wings already exists, and an additional 1,000 planes are needed to bring existing Air Corps up to required strength. General Douglas MacArthur, Chief of Staff, explaining the expansion program before the Military Affairs Committee of the House of Representatives where it has been introduced as a bill by J. J. McSwain, chairman of the committee, emphasized the difference between the function of the proposed GHQ force and that of the Air Corps, which supplements troops on the field, primarily as an observation unit. The GHQ Air Force which would be instantly available to the chief of staff, would serve as the main striking force of the air, a powerful and speedy general reserve to be hurled at the point where it would prove most damaging to the enemy. Following the report of the Morrow Board, appointed by President Coolidge in 1925, the Air Corps embarked on a five-year program, terminating in 1931, which never reached fruition because of lack of appropriations. PWA's allotment for 100 new planes and the $8,000,000 providing for 348 planes in the Army budget bill, now before the House, will be insufficient for the new program to be completed between 1934 and 1939, and an additional appropriation will be asked by Congress, approximated at $76,000,000.

After introducing the War Department's program as a bill, J. J. McSwain, brought up a bill of his own, providing even more drastic reorganization of the Air Corps. While retaining military air forces under the War Department, Mr. McSwain would separate them

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ZANTFORD D. GRANVILLE, designer of the famous Gee Bee racers made by the Granville Aircraft Corporation of Springfield, Mass., was fatally injured on Feb. 12, when his plane crashed in attempting a landing at the Spartanburg, South Carolina, airport. In 1928 Z. D. Granville and his brothers produced the first of the Gee Bees, with which Lowell R. Bayles won the Thompson Trophy Race in 1931 and Major Doolittle recaptured the land plane speed record for the United States in 1932. Suspending operations in Springfield last October, Mr. Granville organized the firm of Granville, Miller, and de Lackner, consulting aeronautical engineers, in New York.

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entirely from the General Staff, making the Chief of the Air Corps responsible solely to the Secretary of War. The proposed personnel strength of 5,559 officers, 32,804 enlisted men together with a total of 4,834 planes would be achieved in five years from July 1, 1934. A separate promotion list for the Air Corps is also provided which would suspend normal promotions in the rest of the Army until the Air Corps reaches total strength and strength in grade. An Air Reserve similar to the present Reserve organization, is provided for in a second bill. Carrying his proposals further to include civilians, McSwain submitted a third bill which would set up a Junior Air Reserve to be composed of young men between 18 and 21 years of age who would be given instruction and training in aerodynamics and flying.

Check and double check

For the first time in history a complete, full scale transport airplane has been tested to destruction. To refute certain criticism made of the Boeing 247 airplane, one of the machines was withdrawn from active service (after some 1,400 hours on regular schedules) and sent to Wright Field for flight and structural tests by both the Air Corps and Department of Commerce engineers. After having been given a thorough workout aloft in the hands of competent test pilots, and pronounced OK under all load conditions, the big machine was set up in the laboratory and loaded with dead weight until structural failure occurred. Load factors considered satisfactory by the Department of Commerce for this type of ship were exceeded by a considerable margin.

Pilots' union loses

Result of the election among 84 TWA pilots by the National Labor Board (AVIATION, February, page 55) was 51 votes for the TWA Pilots Association, 30 for the Air Line Pilots Association, and three votes for individual representation.

Heil, Lufthansa!

First to reach the goal of a trans-Atlantic postal service, toward which France and Italy are also striving, (AVIATION, February, p. 53) Deutsche Lufthansa inaugurated regular bi-monthly 6½-day service from Stuttgart to Buenos Aires during the first week of February. Weekly schedules are promised for March through September, connecting through the summer with the Graf Zeppelin.

Southern pylons

At the Pan American Races at New Orleans' brand new Shushan Airport, Jimmy Wedell, Louisiana's famous son, carried off the new speed laurels by breaking the world record for land planes over a 100 kilometer course (62.137 miles). His speed of 266 m.p.h. exceeded by 17 m.p.h. the old mark established by Lt. Cyrus Bettis on Oct. 12, 1925 at Mitchell field.

International trade rights

Anthony H. G. Fokker recently obtained for his company in Holland the manufacturing and sales rights for the Douglas DC2 for all countries in Europe except Russia. His coverage extends to all British Dominions except Canada.

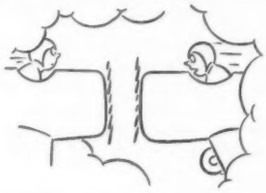
Nicolas-Beazley Airplane Company, Inc., announce that they are now the American representatives of the British Pobjoy engine. These compact power plants, ranging from 65 to 90 hp., are particularly suited to light planes.

SIDE SLIPS

By Robert R. Osborn

FROM the *Aeroplane* magazine of England we learn the details of one of the British Air Ministry's Notice to Airmen, entitled "Cloud Flying: Precautions to be observed to Minimize Risk of Collision." It seems that there are thirteen areas set aside wherein members of flying clubs may practice cloud flying on Mondays, Wednesday mornings and Fridays. Also there seem to be nine areas in which civilian pilots should avoid cloud flying on Tuesdays, Wednesday afternoons, Thursdays and weekends because of the possible use of those areas by Special Reserve and Auxiliary Air Force pilots. The R.A.F. pilots apparently can be flying, without notice, in clouds above 2,000 ft. at any time, anywhere in Great Britian.

We are somewhat familiar with the weather in the vicinity of Buffalo, and



had always thought that the British weather was comparable to that of this section of this country. In the neighborhood of Buffalo there is far greater danger of collision in the open spaces than there is in the cloud and fog areas,—on the days when there are open spaces. A similar "Notice to Airmen" for the Buffalo vicinity might well read: "Before entering any areas clear of clouds, fog, hail or lightning make sure that no airplanes, autogiros, free balloons or dirigibles are intending to pop through the same hole."

The Aeroplane also carries the following note in a short news item concerning the Douglas Transport: "Then there is the story of the T.W.A. passenger agent riding on it (the Douglas) late one night, who would have gone to sleep but the two other occupants of the ship, at the other end of the 20-ft. cabin kept him awake with their low-toned conversation.—Take a very big factor away on that yarn if you want."

Of course the Douglas is known to have a very silent cabin, but we agree with the *Aeroplane* editor that this is probably a very tall story. In fact, being familiar with the usual conversation of

traveling salesmen, as well as with that of airline passenger agents, we think that the report contained a typographical error,—that one sentence should have read,—"kept him awake with their *low* conversation."

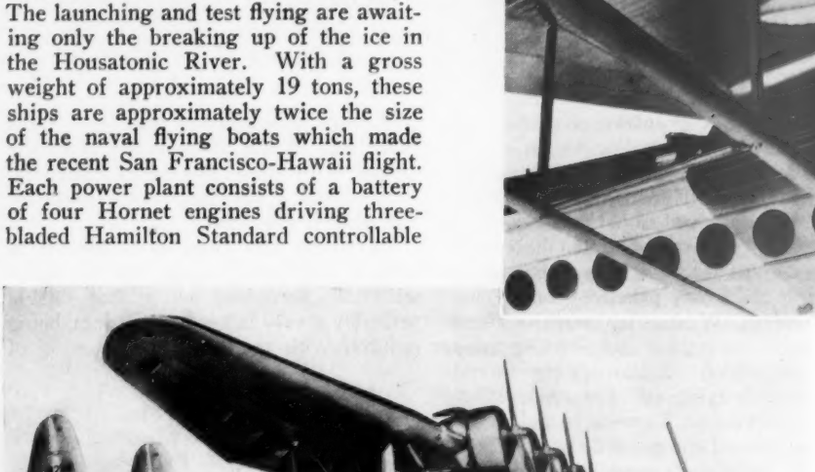
Were it not for the very serious aspects of the Congressional investigation of the aircraft industry, and the resulting wholesale cancellation of contracts, the proceedings would be highly amusing, combining the best features of the old-fashioned melodrama and a Gilbert and Sullivan operetta. One can imagine Mr. Farley hissing through his teeth as he says to the air mail contractors: "Give me the papers (Mr. MacCracken's missing ones) or I shall keep the che-e-e-ild (the air mail subsidy, of course)."

Mr. MacCracken's unsuccessful attempts to get himself arrested by the senatorial Sergeant-at-Arms, Mr. Jurney, show how completely the Republican lobbying system has been removed from power,—even one of the lobbiests hasn't influence enough to get himself arrested.

We do hope that Mr. MacCracken's staying as an uninvited guest overnight in Mr. Jurney's apartment does not prove to be portentous,—in that the air mail contractors will have to be living with the wife's relatives and friends until the difficulties get settled.

Pan American's Super Clipper

THE veil of secrecy which has been so carefully preserved about certain goings-on in the Sikorsky factory at Bridgeport has been drawn aside sufficiently to permit a glimpse of the first of the three new flying boats under construction for Pan-American Airways. The launching and test flying are awaiting only the breaking up of the ice in the Housatonic River. With a gross weight of approximately 19 tons, these ships are approximately twice the size of the naval flying boats which made the recent San Francisco-Hawaii flight. Each power plant consists of a battery of four Hornet engines driving three-bladed Hamilton Standard controllable



The first of the Sikorsky Super-Clippers for Pan-American Airways emerges from the Bridgeport shop. This is one of three long range flying boats now under construction. Above: Three thousand horses in four Pratt & Whitney supercharged Hornets will enable the new Clipper to cruise at 150 m.p.h. Note the excellent cowling and streamlining of the nacelles; also the streamline center section support on the center line of the hull. Details of the wing-bracing system are also visible.

pitch propellers through reduction gears. With a total of 3,000 hp. the plane (fitted up with accommodations for 32 passengers) is expected to show a cruising speed of 150 m.p.h. over a non-stop range of 1,200 miles. These liners will first go into service on Pan-American Airways' routes between the United States and South America. As mail carriers (without passenger accommodations) on trans-atlantic routes the new Sikorskys are expected to be able to compete on a more than equal footing with existing German and French designs.

Although full details of construction and performance are not available at the moment, a study of a group of photographs taken at the Bridgeport factory show a number of interesting features. It is obvious that although certain details carry a marked resemblance to previous Clippers, the familiar Sikorsky arrangement of short-hull and boom-carried tail surfaces has been abandoned. In this case, the hull has been extended sufficiently to provide support for the tail surfaces. Also, in previous models, the wings were carried rather high above the hull and engines were mounted in individual nacelles. Here, in accordance with the most recent research results for minimum drag and high power plant efficiency, the engine mounts have been streamlined into the leading edge of the wing. The wing-bracing system has also been considerably simplified. The center section which contains the four power plants is supported by a completely streamlined structure (which houses all the engine control connections as well as the primary supporting members) arising from the center line of the hull, and a pair of inclined streamline struts on each side tying into the center section outboard from the outside engine mounts. The center section is rectangular in plan form, but the wing-tips, which are full cantilevered, are strongly tapered. Ailerons extend practically the entire length of the tip sections. The center section carries a trailing edge flap along its entire span. The pontoons which in the S-40 were attached to the primary wing-bracing structure are now suspended independently below the center section-wing-tip connecting points. No provision has been made to carry fuel in the wing floats as was done in the S-40. The rearrangement of the power plant, and the elimination of much of the exposed wing-bracing of previous models may be expected to account for considerable improvement in performance.

As for structure, it is probable that the usual Sikorsky practices have been followed, where the hull is made up entirely of duralumin sections covered with smooth Alclad. The wing structure is metal throughout (very likely of built-up duralumin girders as in previous large Sikorsky boats) completely fabric-covered. Although nothing has so far been released with specific reference to maintenance features, it may be assumed that all parts of the design have been studied for maximum accessibility for inspection and repair.

Curtiss-Wright Condor goes military again. The DT-32 Bomber developed at the St. Louis plant for demonstration to the Chinese Government by Commander Frank Hawks. Two Cyclone R-1820F-2 engines give the machine a top-speed of over 175 m.p.h. with full military load.

Curtiss-Wright BT-32 Bomber

WITH the announcement by Ralph S. Damon, president of the Curtiss-Wright Airplane Company, of the completion of a new Condor Bomber which Comdr. Frank Hawks will shortly demonstrate to the Chinese Government, another cycle has been completed. Designed first as a heavy bomber for the United States Army, the Condor put on civilian attire along about 1928 to become a commercial transport machine. In its latest revised form (AVIATION, February, 1933, page 58) it is now in wide use on many of the country's airlines, including Eastern Air Transport and American Airways. It will be recalled also that Admiral Byrd has one of these machines with him in the Antarctic.

Based on the latest transport design, the Condor has again gone military in a big way. Provision has been made for a 2,400-lb. bomb load with two large bombs (1,100-lb. each) carried in a compartment in the bottom of the fuselage, or with eighteen 100-lb. bombs slung in racks under the lower wing. In the latter case two larger bombs may also be carried in the fuselage compartment to bring the weight up to the total allowance.

The bombardier's compartment is located directly to the rear of the co-pilot's seat in the bottom of the fuselage. The sides of the compartment are constructed almost entirely of pyralin, permitting him almost unrestricted vision. An altimeter and an airspeed indicator are provided for his own use. His proximity to the pilot is also an aid to accurate bombing.

The defensive armament consists of five 30-caliber machine-guns, two of which are mounted in transparent turrets in the top of the fuselage, one forward and one aft. Another gun is located in the bottom of the fuselage and the others, one in each side. The rear gunner thus has four guns available covering the rearward areas. In addition he has at hand complete photographic aerial mapping equipment.

The large size of the fuselage of the Condor makes it possible to adapt the machine to other military purposes, notably the transport of troops and the carriage of sick and wounded. Without making any changes in the construction, twelve stretchers may be installed for the latter purpose. A large door is provided so that the machine may be easily loaded and unloaded with stretcher cases. With stretchers all in place there is plenty of room left for nurses and doctors to work on wounded while in flight. For transport use, benches may be installed to carry 24 soldiers with full field equipment.

The bomber is powered with two 700-hp. Wright Cyclone R-1820F-2 engines mounted in the latest transport type nacelles and equipped with full cowling. With full load (gross weight 17,500 lb) it has a top speed of over 175 m.p.h. The 728 gal. of gasoline (distributed among four 75-gal. tanks in the upper wing, and four 107-gal. tanks in the fuselage) provide a range of 1,200 miles. Three-bladed Curtiss electric controllable pitch propellers (diameter 11 ft. 6 in.) have been fitted. These propellers have an infinite range of pitch setting from 0 to 90 deg. It is thus possible to "feather" the blades of a propeller stopped in flight to lower the drag and increase the efficiency of the plane with respect to speed and climb on one engine.

In general dimension and construction the DT-32 Bomber corresponds with the T-32 Condor transport. The usual retracting gear (of the mechanical type with electric motor operation) is installed, but fittings are provided so that twin Edo floats of the type supplied to Admiral Byrd may be substituted.

NEW VOLUMES FOR THE SHELVES

WINGS OF WAR, *by Rudolf Stark; John Hamilton, Ltd.; London, 1933, 227 pages; $2, approximately.*

THE diary of a German officer through the last year of the War, "Wings of War" is written from an almost unique point of view. There have been books about the War in the air from men who found it terrifically exciting, and from men who found it horrible, and (a great many of these) from men who found it a job to be done and finished and then put aside as completely as possible. This is one of the very few books that shows something like enthusiasm for the War for its own sake. He sets the note in his preface: "There will always be war as long as there is life on earth. . . . . We airmen had the best part of the War allotted to us. We still had the honorable combat of man against man. And we loved these combats above all else. Because we loved them wholeheartedly, the War became a thing of beauty for us. Therefore we found a home in the War." With only occasional relapses, this same enthusiasm for the beauty of combat pervades the whole book.

It is a book exceptional not only in its point of view but in its style, beautifully written, though in a somewhat exclamatory fashion. No one who has read other volumes on the War in the air ought to pass over this one. "Wings of War" goes upon the reserved shelf that already holds "War Birds," Norman Hall's "High Adventure," McCudden's "Five Years in the R.F.C.," Elmer Hazlett's, "Luck on the Wing" and Richthofen's "Memoirs."

GENERAL BALBO, *by Fischer von Poturzyn; Verlag Scherl; Berlin, 1933; 91 pages; 80 cents approximately.* A biography by a very well-known German writer on commercial aviation and international air policy of Italy's great air leader, now detached from his beloved air forces. The first half of the book deals with Balbo's early life and attachment to the Fascist cause, the second half with the aeronautical experiences that carried him at the head of his squadron from Rome to Brazil and subsequently from Rome to Chicago and back.

THE BUYERS' LOG BOOK

AVIATION'S *Card Index of New Equipment*

This department is equipped to help readers locate manufacturers of any parts, accessories or materials

AIRPORT EQUIPMENT — **Conduit fitting**

The Pyle-National Company,
1334 North Kostner Ave., Chicago, Ill.

NEW FORM of flexible conduit fitting has been developed especially for wiring up motors and other electrical equipment around gasoline pumps, dope rooms etc., where an explosion hazard exists. Flexible, easily installed. Tested to 500-lb. hydrostatic pressure. Underwriters' Laboratories rate it for Class I Group D, and Class II Group G hazardous locations.

AVIATION, *March, 1934*

SHOP EQUIPMENT — **Lamp guard, portable**

Guardian Manufacturing and Supply Company,
333 West 52d Street, New York, N. Y.

FULLY insulated, non breakable guard for portable lamps for shop and hangar use. The guard is molded of a high dielectric compound incorporating a reflector or eye-shade. Handle of soft rubber locks with guard into a compact unit. Keyless socket, rubber cord, rubber plug. Takes 25 or 50-watt mill-type lamps. Cannot short or flash over to cause fire or explosions.

AVIATION, *March, 1934*

MATERIALS — **Aluminum solder**

Kester Solder Company,
4201 Wrightwood Avenue, Chicago, Ill.

A FLUX-FILLED solder for aluminum has been announced. Like other Kester solders, the new aluminum solder is in wire form with a hollow core filled with the fluxing material. It is put up in small spools in tins for small shop use, and also in one pound spools for commercial and industrial use such as radio and electrical manufacture and repair, airplane maintenance shops, etc.

AVIATION, *March, 1934*

MATERIALS — **Dopes (catalog)**

Titanine, Inc.,
Union, Union County, N. J.

A TREATISE on the history, manufacture, specifications and uses of dopes and finishes for aircraft is available. Instructions are given for the preparation of all types of structures, wood, metal or fabric,—external and internal,—and also the details of the finishing processes. Includes specifications for dope rooms, analysis of troubles, color card of Titanine products, etc.

AVIATION, *March, 1934*

PARTS — **Bearings (catalog)**

Norma-Hoffman Bearings Corporation,
Stamford, Conn.

A COMPLETE line of precision ball bearings designed especially for aircraft controls covered by catalog F-936. Contains descriptions, tabulated specifications, and load ratings of the types of ball bearings commonly used. In addition, a number of drawings are included which show a wide range of typical applications. Copies are available on request.

AVIATION, *March, 1934*

SHOP EQUIPMENT — **Lathes (catalog)**

South Bend Lathe Works,
South Bend, Ind.

LATHES of all types for production, maintenance and repair shops are included in Catalog No. 94. Lathes are available in all sizes from 9 in. to 18 in. swing arranged for motor or belt drive. Built in bench or leg-mounted styles for both high precision and heavy production duty. Catalog also covers lathe tools and auxiliaries. Copies available on request.

AVIATION, *March, 1934*

SHOP EQUIPMENT — **Profile gages**

Stockton Profile Gage Corporation,
165 Jackson Street, Lowell, Mass.

STOCKTON profile gages consist of a series of slotted laminations (each from .032 to .010 in. thick) held together by adjustable clamps. With clamps loosened the gages may be set to conform with any desired profile then clamped tight to form a permanent or temporary template against which drawings or other parts may be checked. Adapted to wide range of uses. Catalog available.

AVIATION, *March, 1934*

SHOP EQUIPMENT — **Small tools, hammers**

The Stanley Works,
New Britain, Conn.

A NEW soft faced hammer for automotive and aircraft use has faces made of a new celluloid composition which is very tough and resilient. Center body is steel with hickory handle. Composition faces are fitted into steel body. When worn, faces may be renewed by twisting off old faces with a pipe wrench and driving new ones into sockets in head.

AVIATION, *March, 1934*